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VIEWS, NEWS AND INTERVIEWS.

Meekin, the lazy inventor, strolled into the ELECTRICAL REVIEW office the other day. His right hand was encased in a bandage. When asked what was the matter, he said: "Oh, nothing much. Simply stroked the fur of an electric fan the wrong way."

Mr. E. I. Garfield, now with the Fort Wayne Electric Corporation, but for many years connected with the Thomson-Houston interests, is widely known in the electrical field as a well informed and keen business man. As a humorist, Mr. Garfield has achieved little fame, but the following extract from a letter which he recently wrote to President A. M. Young, of the New England Engineering Company, of Waterbury, Conn., will show that Mr. Garfield could easily establish a reputation as a wit, if he so desired:

I wish we could receive more orders for transformers from your companies. Can you suggest some way that it can be done? How are matters progressing at ———? Do 't you want something for that station, which I understand is to light not only that town, but two or three others around there, and among others ———. You certainly want to light that place well. The lights from our machines are guaranteed to give cool weather on the Sound during the Summer, and to also drive away all bacteria. Malaria, and fever and ague are unknown where our machines are. They are also death to sand flies, mosquitoes and cockroaches. If necessary, I will make affidavit to the above facts, and I believe Mr. Hosmer will give you a certificate that my word is good for anything that I may state.

Another newspaper story about Thomas A. Edison is floating around. This one is about the reception of the inventor by Emperor William of Germany. When Edison brought his phonograph to the palace, by invitation, the Emperor took him into his private cabinet, no one else being present, carefully closed all the doors and then besought him to take the marvelous invention apart and explain to him all its workings. This was done, and the inventor was invited to attend a court reception next day and to bring the phonograph with him. Upon this occasion Edison found the Emperor surrounded with a brilliant throng of nobles, each one decorated with the insignia of his rank. When he produced his mysterious invention, the Emperor took it in hand, eyed it critically, as though he had never seen it before, then took it apart and explained to the amazed courtiers exactly how it performed its wonders. He never said a word about his instruction of the day before.

The Mannesmann Tube Works, Germany, have, according to a contemporary, recently constructed a flywheel especially designed to withstand strains due to centrifugal force. The wheel is made up of a cast-iron hub or boss to which two steel plate disks or checks, about 20 feet in diameter, are bolted. The space between the disks is filled with some 70 tons of No. 5 steel wire, completely wound round the hub.

The trolley line between Orange and South Orange, N. J., which is about three miles long at present, is built entirely through private property, and it is proposed to run cars over the route at the rate of 30 miles an hour or more. The road is through one of the most picturesque parts of the Oranges. It will provide the first public means of communication between the South Orange Field Club grounds and any of the business sections of the Oranges. The line crosses and recrosses the east branch of the Rahway River, over substantial bridges, in a serpentine course.

The torpedo station at Newport, R. I., and the torpedo boat "Cushing" had a search-light contest the other evening. The "Cushing" left her dock during the afternoon and went outside, where her crew were exercised with rapid-firing guns. As darkness came on the lights at the station began to sweep the waters of the bay and the craft, with all lights hidden, steamed up the channel twice. She was picked up when just inside Fort Dumplings, a distance quite too far for her to have been effective with torpedoes against the station.

The French cable steamer "Pouyer Quertier," lying at St. John's, Newfoundland, bound for the West Indies, was searched recently by customs officials on suspicion of having aboard a quantity of arms and ammunition for the Cuban rebels. Information to this effect had been lodged with Colonial Secretary Bond, who ordered the search, but nothing was found.

FIG. 1.—THE "A-B" ARC LAMP.

Stamford, Conn., was in darkness for two hours the other night, and all because of an eel that got into the water pipe that supplies the electric light station.

The "A-B" Arc and Incandescent Lamps.

In the ELECTRICAL REVIEW for Oct. 16 a description was presented of the "A-B" arc lamp, manufactured by the Adams-Bagnall Electric Company, of Cleveland, Ohio. The illustration of the arc lamp was crowded out of that issue and is shown herewith. Following are a description and illustrations of the "A-B" incandescent lamp, made by the same company. (See page 244.)

The "A-B" lamp is constructed without the glass tip on the large end. This, the makers claim, may seem a small matter upon first thought, but further consideration will enable one to realize the important changes made. The glass tip is caused by welding a tube to the large end of the bulb and then sealing off close to the bulb when the air has been exhausted. In order, therefore, to get rid of this tip it is necessary to seal off at the other end. To do this it is necessary to abandon the usual glass mount. This changes the entire interior construction of an incandescent lamp, and the "A-B" lamp presents an entirely new appearance. The side of the bulb is drawn inwardly in the shape of sharp pointed projections which take the place of the usual glass mount.

The platinum wires are conducted through the walls of the bulb at diametrically opposite points, as far apart as it is possible to place them, and all trouble from short circuiting at this point is therefore avoided. A new feature in the manufacture of this lamp is the application of a small brass ferrule to the lamp during the process of construction. When the leading-in wires have been attached to the platinum they are laid along the neck of the bulb in small grooves provided for that purpose. Over these wires and the neck of the bulb is then placed the ferrule, which seats on the glass. The plaster or cementing substance is then placed in the open end of the ferrule, filling the grooves and depressions in the glass made for its reception.

After this the bulb is exhausted and sealed off at the neck end. The lamps are placed in stock in this shape. It can be readily understood that with an open end ferrule the plaster can be better applied to the glass than with a blind end base. The plaster being applied during the process of construction has ample time to dry and harden before the lamps can be shipped to market. This avoids all trouble arising from green lamps or lamps which will loosen at the base. This loosening at the base, it is said, has been one of the greatest difficulties lamp manufacturers have had to contend with.

A lamp base is not constructed with a view to its being attached properly by plaster to the neck of a glass bulb. This additional brass ferrule seems to perform an important function in thus surrounding a serious difficulty in the manufacture of incandescent lamps. The fastening of the lamp base to the ferrule is accomplished by mechanical means and without loss of time waiting for the plaster or cement to dry. Care has been taken by this company to select a very handsome shaped glass bulb. It is novel in every respect. Patents have been awarded this month to the Adams-Bagnall Electric Company covering this lamp and its method of construction.

Chicago Parks and Boulevards To Be Illuminated.

Mr. Foree Bain has been selected as engineer to design, purchase and install an electric light plant for the purpose of illuminating the parks and boulevards in the city of Chicago for the West Side Board of Park Commissioners.

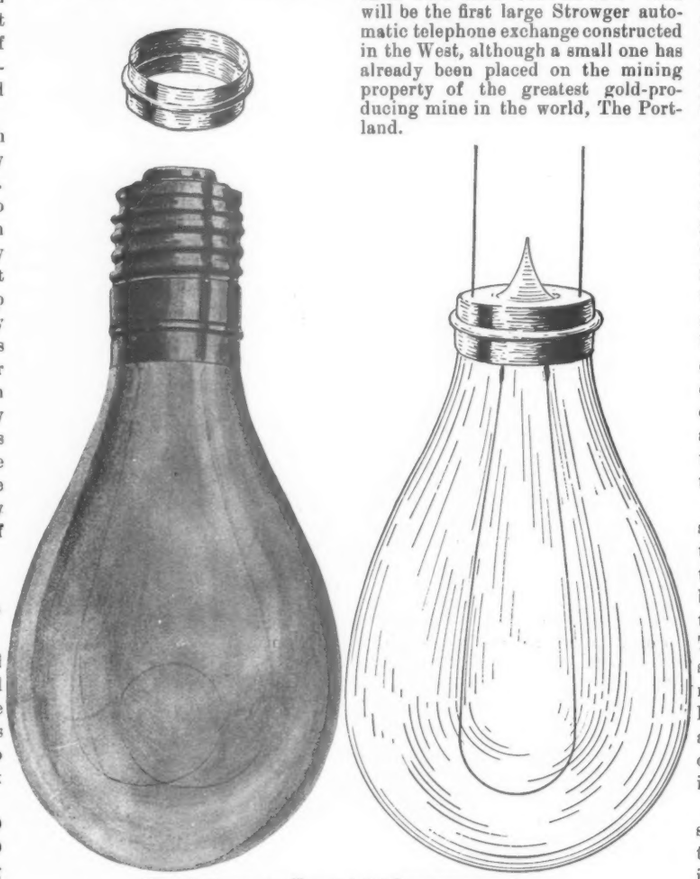
The plant will consist of 1,000 horse-power boiler capacity, two 500 horse-power compound condensing Corliss engines, a six-inch jack shaft, with automatic oilers, necessary clutches and pulleys and eleven 100-light arc dynamos. There will be one thousand 2,000-candle-power arc lamps installed. The lamps will be hung from newly designed park poles. The wire will all be placed underground. There will be required for the plant about 100 miles of underground lead-covered No. 5 cable. When finished the plant will be a model. It is Mr. Bain's design to construct the plant with a view to the lowest possible cost of operation. The work of placing the conduits will be begun at once. Apparatus will probably not be required before the first of the year. Mr. Bain is now drawing specifications with a view to submitting them for the purpose of receiving propositions for the apparatus required.

"Holland," in the Philadelphia *Press*, says that the New Haven Railroad, by its control of the New England, proposes to abandon the use of steam upon a line stretching from the Connecticut River to Waterbury, 35 miles, through Meriden, and to substitute electricity for it.

TELEPHONE NEWS AND COMMENT.

It is expected that the Tampico exchange of the Mexican Telephone Company will be completed by November 1. It is reported that this exchange has already secured over 100 subscribers.

The 5,849 shares of American Bell Telephone Company unsubscribed for by stockholders will be sold by auction on Wednesday, October 30, by R. L. Day & Company, instead of October 29, as heretofore officially announced.



FIGS. 2, 3 AND 4.—THE "A-B" INCANDESCENT LAMP.

A Chicago dispatch says that the Wisconsin stockholders of the Standard Telephone Company, which was organized to revolutionize the telephone business, have demanded an accounting of the money subscribed by them. Several letters have been written to the officers and if an accounting is not soon forthcoming suit for the recovery of the money is to be brought.

The expected early inauguration of a direct cable from the island of Hayti to the United States, in connection with the Commercial Cable to Europe, the French cable to Santiago de Cuba, Venezuela, Curacoa and Brazil, and the English line to Panama, Jamaica and other West India islands, is to be celebrated as a national holiday by the governments both of Hayti and San Domingo.

The Citizens' Telephone Company, of Trinidad, Colo., secured an ordinance June 17 for an opposition telephone exchange in that city, with rates of $24 and $36, respectively, for residence and business places. On October 14 the City Council revised their ordinance to conform in part to the desires of the Colorado Automatic Telephone Company, of Colorado Springs, Colo., who will immediately begin the construction of a Strowger automatic telephone exchange at that place. Among other changes the rates were made $30 and $40. This will be the first large Strowger automatic telephone exchange constructed in the West, although a small one has already been placed on the mining property of the greatest gold-producing mine in the world, The Portland.

KIND WORDS.

INFORMATION IN THE ADS.

TO THE EDITOR OF ELECTRICAL REVIEW:

I enjoy reading your paper very much. The amount of information I have obtained from reading the advertisements would alone be worth the cost of the paper.

Respectfully,
Army Officer.

Ft. Leavenworth, Kas., October 14.

REGRETS HE DIDN'T SUBSCRIBE SOONER.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have just received the first number of the ELECTRICAL REVIEW, which I subscribed for. Am indeed sorry I had not been a subscriber long ago. M. W. J.

Elmer, Mich., October 8.

UP-TO-DATE.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have been in receipt of your paper for the past six months. I am very much interested in this line of science, and have found your paper up-to date in every detail. R. A. G.

Grand Island, Neb., Oct. 12.

THE RATING AND BEHAVIOR OF FUSE WIRES.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK AND CHICAGO, OCTOBER 23, 1895, BY W. M. STINE, H. E. GAYTES AND C. E. FREEMAN.

It is with a certain feeling of hesitation that the attention of the general engineering profession is again called to a series of investigations relating to the well-worn subject of fuse wires. Within the past few years a number of able papers on the subject by Messrs. Jackson and Ochsner, Mr. C. P. Matthews and others, have been presented to the Institute. These have ably supplemented the work of Preece and other foreign investigators, and at the same time developed some points hitherto neglected. The latest contributor to this subject has been Mr. W. E. Harrington, who employed the circuit breaker in his tests. The literature of the subject has been further increased by several excellent theses emanating from our leading technical schools. The bibliography, too, of this subject has already been referred to in the transactions of the Institute.

However, the thermal cut-out is still one of the most unreliable of the many devices employed on electric circuits. Its use is universal, but beyond a few practical details the device is but little understood. The blocks in which they are used show some slow improvement, but most of this has been due to the vigilance of insurance boards, and they are still far from perfect. As a source of vexation and uncertainty, the fuse is probably unrivaled.

An analysis of the literature of the subject shows that the theory of the thermal cut-out has been thoroughly investigated. The elements entering its action have been carefully studied and incorporated into fairly satisfactory equations. Yet all tests and treatments have shown the thermal cut-out to be subject to such variations and modifying influences that but little of practical value can be deduced from analytical investigations.

These considerations led the writers to attempt further investigations. The fuse was dealt with as an auxiliary to electrical circuits, and its behavior under such conditions was carefully studied. The work in great part bears on points already treated of, but it was considered best to study the entire subject afresh, and endeavor to present a more or less complete discussion of the behavior of the ordinary alloys employed in practice. Naturally, the data obtained has been voluminous, in all some 1,300 determinations; but great care has been taken to thoroughly check all results.

THE APPARATUS.

Fig. 1 is a plan drawing of the main and auxiliary apparatus, with all connections indicated. One of the dynamo leads was brought to the switch S. This switch was especially designed and constructed for these tests. The pivot was placed well toward the handle to make the travel of the blade as rapid as possible. The

carbon rheostat, C. R., was built up of carbon plates, whose contact resistance was readily varied by screw pressure. The fuse was tested in a large box lined with asbestos, and open at the top, permitting of inspection and access, while at the same time protecting the fuse from draughts. The lamp rack, P, held 100 sixteen candle-power 110-volt incandescent lamps. These were connected in groups to switches, which enabled any combination from 1 to 100 to be used. A step-by-step rheostat in multiple with this rack was used to adjust the current through the interval of one lamp.* By its use the current could be accurately adjusted within the limits of .4 and 60 amperes. For higher currents several similar racks were placed in multiple; L_1 and L_2 were small "pony" relays of 20 ohms resistance, having in series with each five 16 candle-power 110-volt lamps (R_1 and R_2). These relays worked on a current of about 10 milli-amperes each, and were wired to close the circuit through the primary of the induction coil I. Two storage cells furnished the currents for these relay circuits. T was an electro-magnetic tuning-fork driven by an independent storage-cell; C an iron chronograph drum which was turned by hand. The secondary or spark circuit of the induction coil was connected to the tuning-fork and the chronograph drum, respectively.

METHOD OF EXPERIMENT.

The current to which the fuse was subjected during the test was first measured accurately by throwing the switch on contact, O, and passing it through the Weston ammeter, A. Both the circuits passing from the jaws (O and N) of the switch to the point of conjunction, Q, were short, and of No. 4 American wire gauge wire. It was thought best to take the resistance of the fuse into account and adjust the resistance of the ammeter circuit to exactly equal that of the fuse circuit. To accomplish this a current smaller than the known fusing current was sent through the fuse, and the fall of potential from S to Q noted on a Weston milli-voltmeter. The current was next switched on the ammeter circuit, and the fall over this, from S to Q, was made exactly that over the fuse circuit by adjusting the compensating carbon rheostat. The fusing current, being accurately measured, was switched over on the fuse. The fusing time was thus accurately ascertained. The lamp rack being a non-inductive resistance, the time interval for the current to rise to its full value on the fuse is negligible for all but the very shortest periods. The resistance of the bank of incandescent lamps could not materially alter during the quick throw of the switch, which was thrown by striking it a blow on the handle. Frequent observations made on the lamps did not reveal even the slightest tremor of the light when the switch was thrown. To render the point more certain, the time interval between the break and make of the switch was accurately determined chronographically, and found to vary between $\frac{1}{100}$ and $\frac{1}{1200}$ of a second. The fusing times were noted on a stop watch for all periods exceeding one second. For shorter periods the chronograph arrangement was used. The tracings of the electro-magnetically-driven tuning-fork, T, were made on smoked paper fastened over the drum, C. This fork was always rated before each set of experiments by switching it in circuit with a standard second clock. Its rate was about 67 double vibrations per second. By frequent timing all changes in rate due to temperature, etc., were noted and allowed for. The amplitude of the fork was large enough to allow periods of less than $\frac{1}{1200}$ second to be accurately measured. The records on the drum were made by sparks from the induction coil upon the breaking of one of the relay circuits.

The action of the relays was as follows: When the switch was on O, L_1 was closed and L_2 open; when the contact was broken at O, L_1 opened, throwing a spark on the drum, and L_2 closed. The switch-making contact at N, L_1 closed and L_2 opened, making the second spark record. When the fuse blew, L_1 opened, causing the third spark record. Though both relays acted synchronously, there was an interval during which the current through coil I was completely broken. Two distinct records were made in every case. The interval between the first and second sparks gave the period of open circuit for the switch, while the interval for the second and third sparks gave the fusing times. The relay circuits are indicated with sufficient clearness on the diagram.

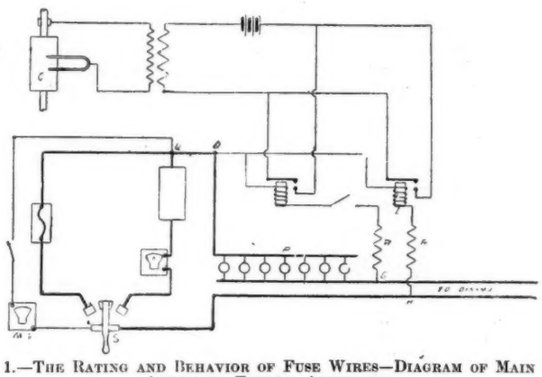


FIG. 1.—THE RATING AND BEHAVIOR OF FUSE WIRES—DIAGRAM OF MAIN AND AUXILIARY TESTING APPARATUS.

THE EXPERIMENTS.

As our experiments were designed to exhibit the behavior and characteristics of the fuse used for protecting electrical circuits, it was considered best to adopt not more than two brands of wire for all the tests, rather than employ a large number of varieties. Other investigations have shown that the various makes of fuse wire closely resemble each other in behavior, and the conclusions obtained with one wire would be general for all. The first make of wire was purchased from supply houses, the second was furnished by the manufacturers.

FIRST SERIES.

These tests were made under conditions which we shall call commercial, or those which obtain in practice. In all cases the fuse wire was carefully inserted, so as to obtain a uniform pressure of the wire under the screw head without unduly crushing it. The same block was used repeatedly, and little care taken to keep the terminals clean. This was done to more nearly imitate practical conditions. In only two or three cases out of hundreds of fuses blown did the rupture occur at the contact. Two classes of porcelain cut-outs were employed; one was the open porcelain base "Main Line" style, the other the closed porcelain "K. W." variety. In the latter, the 10-ampere size has a space of only one-half inch between its terminals, though the fuse is suspended out of contact with the porcelain base. This style of block has recently been condemned by the underwriters, and very properly. With the terminals so close together, a fuse blowing under 20 amperes invariably establishes a viscious arc, and the terminals melt with such explosive violence as to frequently shatter the block. Though the open type of block has an added fire risk, the terminals are, as a rule, further apart. A pronounced fault in their construction is that the terminals are let in flush with the surface of the porcelain. Nearly all types of porcelain fuse blocks merit severe criticism on several points. The terminals are too close together in small sizes, the fuse often resting on the top or base; and their mechanical construction is very poor. Too little attention seems to be given to the proper function of a fuse block in its design.

Table I needs but little comment. It clearly shows the unreliability of the porcelain fuse blocks used and also the imperfect commercial rating of the fuse wire, A. The limit of fusing time was 60 seconds. Fuses larger than five amperes will often blow in from one to three minutes on a current somewhat less than stated, but this correction is so slight for these results that it need not be seriously considered.

TABLE I.

FUSING CURRENTS IN AMPERES—LIMITING TIME ONE MINUTE.

	A ⅛ Amp.	A 1 Amp.	A 2 Amp.	A 3 Amp.	A 5 Amp.	A 10 Amp.	15 Amp.	B 4 Amp.	B 8 Amp.	B 12 Amp.
Covered Block, ¼ inch	2.5	5	10	14	20	35	—	13	—	—
Open Block, ⅞ inch	3	5	9	10	15	25	—	—	—	—
Open Block, 1⅞ inches	—	—	—	—	—	—	30	—	—	—
Open Block, 8 inches Vertical	1.5	3	5	6	9	14	20	—	7.5	10
Open Block, 8 inches Horizontally	2	4	6	7	11	—	20	—	—	—

SECOND SERIES.

The open eight-inch block was adopted to avoid all cooling effects from the terminals. When used horizontally the fuse rested on a number of thin asbestos supports let into grooves one inch apart, the fuse being elevated one inch above the base of block. In those tests in which the block was placed vertically, hydrostatic pressure lowered the fusing point, but when used horizontally the data may be regarded as the normal fusing points for these various wires.

The data of Table II will be clearly understood from the accompanying legends. One of our objects was to accurately measure the fusing times for abnormal currents. It is characteristic of all electro-thermal devices that they are sluggish in action. Cases may arise in practice where the insulation of wires is forced to become a fuse competing with the metal supposed to protect the circuit. In all such cases it is only a question as to which shall yield the sooner. There is sufficient evidence in this table to explain why a fuse does not always protect an armature from burning out. The table becomes the more significant in this light when it is noticed that the data has been obtained by the use of an abnormally long fuse block. With the commercial block the fusing times were increased many fold.

TABLE II.

FUSING TIMES IN SECONDS.

Ampere.	I.	II.	III.	IV.	V.
15	84	75.8	—	—	—
20	36.6	35	—	—	—
25	19	17	60	45	195
30	12.8	10.8	33	26	41.6
35	9	7.6	20	16 4	30
40	7	5.8	14	12.6	25
45	5	4.8	10.4	9	17
50	4	4	9	7.4	13
55	3.6	3	6.6	5.8	—
60	3	2.6	5	5	8
65	2.8	2.2	4	4.6	—
70	2.8	1 8	3.6	3.6	5.4
75	2	1.6	3	3	—
80	1.8	—	—	2.6	4.8
85	—	—	—	2.2	—
90	—	—	—	2	3.6
95	—	—	—	1.8	—
100	—	—	—	1.6	3.2
105	—	—	—	1.4	—
110	—	—	—	1.2	2.8

I.—20 Amperes B. Horizontal 8 inches mica supports each inch.
II.—20 Amperes B. Vertical 8 inches.
III.—20 Amperes A. Horizontal 8 inches asbestos supports each inch.
IV.—20 Amperes A. Vertical 8 inches.
V.—25 Amperes A. Vertical 3 inches.

(To be continued.)

Big Suit against the General Electric Company.

A press dispatch from Watertown, N. Y., says that Charles Cohen, an Englishman, who recently located in that city in the real estate business, has commenced a suit against the General Electric Company, of Schenectady, for $200,000, alleged to be due him as commission and for breach of contract in connection with his services for the company in electric power and electric lighting in the gold mining district of South Africa.

The Buffalo Franchise.

The Buffalo, N. Y., aldermen have given a franchise to the Niagara Falls Power Company for the transmission of electrical current through the streets of Buffalo. It gives the company six years without taxation, and requires it to pay five per cent of gross receipts thereafter. The company requested a reduction in tax to two and one-half per cent, but it was refused. The franchise is now before the Common Council.

An Electrical Trade Association in Philadelphia.

The leading electrical supply dealers of Philadelphia are about perfecting arrangements for the organization of an electrical trade association.

* For illustrated description of this lamp-rack see ELECTRICAL REVIEW, New York, October 24, 1894, p. 201.

THE MONTREAL CONVENTION.

FULL REPORT OF THE BANQUET AND INTERESTING RETURN TRIP.

Additional Brief Notices of the Occasion—Personal Mention, etc., etc.

THE BANQUET OF STREET RAILWAY MEN.

A HAPPY GATHERING OF LADIES AND GENTLEMEN IN THE WINDSOR DINING HALL AT MONTREAL.

The most enjoyable feature of the convention, it is safe to say, was the banquet given at the Windsor on Thursday evening, convention week, and which was largely attended, some 260 ladies and gentlemen gathering round the festal board to do honor to the occasion.

The head table, presided over by President Joel Hurt, of Atlanta, occupied a raised dais running the length of the room, and commanding a view of the entire assemblage. Occupying the seats of honor to the right and left of President Hurt were Chief Justice Sir Alexander Lacoste and Dr. Anderson, consul-general for the United States; Mayor Villeneuve and Senator A. W. Ogilvie, Mr. Russell B. Harrison and wife, W. Worth Bean, Hon. Louis Beaubien, Minister of Agriculture; Alderman A. A. Stevenson, J. Harris Stedman, of Rochester; Col. J. H. Cunningham, of Boston, and others.

After the menu had been fully discussed and fragrant havanas lighted, the intellectual feast was started by President Hurt, who opened the proceedings by a toast to "Her Majesty the Queen." This was drunk all standing, to an accompaniment of the English national air by the orchestra.

Sir Alexander Lacoste then proposed the toast, "The President of the United States," which was drunk to the stirring strains of "America."

This toast was responded to in the most happy vein by Consul General Anderson.

Mayor Villeneuve, after responding to the toast to the "City of Montreal," proposed one to the "American Street Railway Association," which was received with great cheering. Mr. Wm. H. Jackson, of Nashville, Tenn., was booked to respond for the association, but to the great regret of those present, he was unable to be in attendance, and Alderman Stevenson, of Montreal, was called on by Mr. Hurt to say a few words. The alderman made a few witty remarks, and as he drifted rather more into politics he accounted for it by stating that, unfortunately for him, he was not a member of any street railway association, but had less hesitation in responding than might have been expected from the fact that he was the first person in Montreal to pay fare in the first car ever run in the city. At least, he was the first one to give a nickel to the conductor, and he hoped the company got it.

Mr. Hurt proposed a toast to the Montreal Street Railway Company, which was most gracefully responded to by Mr. Granville Cunningham, manager of the company, who paid a high tribute to the United States as the leaders of street railway development and the teachers from whom Canada had derived her knowledge.

The toast, "Our Guests," was responded to by both Sir Alexander Lacoste and the Hon. Senator Ogilvie, and then the toast of "The Ladies" was proposed. Immediately every man in the room was on his feet and handkerchiefs fluttered like snowflakes over the heads of the fair contingent, whose blushes conveyed their eloquent response to the unanimous outburst in their honor.

J. H. Stedman rose to respond in their behalf, debonair, witty and gallant, and was received by a tumult of applause which showed he was considered to be the right man in the right place. His short speech sparkled with witty anecdotes touching on the "old" and the "new" woman, and through it all ran the delicate vein of romance for the sex, which makes him so deservedly popular.

Mr. Chas. W. Price, of New York, editor of the ELECTRICAL REVIEW, responded to the toast "The Technical Press," highly complimenting the street railway men for their enterprise in adopting improvements, and the manufacturers for inventing and perfecting them, concluding with a toast in rhyme to—

The street railway man who is the lord of creation,
Over city and suburb has achieved domination.

Mr. Price was followed by several members of the local fraternity in response to "The Press."

The ceremonies concluded by a toast to "Our Next Merry Meeting," proposed by Mr. G. Lusher and responded to by Col. Cunningham, of Boston, after which, on the stroke of midnight, the company dispersed declaring the banquet to be one of the most enjoyable they had ever attended.

THE RETURN TRIP FROM MONTREAL.

The return trip of the New York delegation, whose special train of five Wagner cars and one N. Y. Central composite car left Montreal at nine A. M. on Friday morning, was one of the pleasantest features of the entire trip, and the day spent among the beautiful scenery of the Adirondacks will long be remembered by the fortunate individuals who comprised the party.

The special left Montreal over the C. P. R. at 9 A. M., reaching Saranac Lake at 2 P. M. after a pleasant run, and here tally-hos and mountain wagons were in waiting to convey the party to Riverside Inn and the Berkeley House for lunch.

Appetites were sharpened by the keen mountain air, and the general order in the dining rooms was short and to the point. "Bring me all you've got and bring it quick" covered the situation exactly.

Lunch over, the party again mounted the tally-hos, and after being afforded a glimpse of the lake were carried back to the depot, where the special was in waiting for the run to Lake Placid. This charming spot was reached about 4 P. M., and again tally-hos came into requisition to carry the party to the Stevens House, where the most delightful feature of the entire trip awaited them. The hotel is situated on the summit of a hill in the center of one of the grandest natural amphitheaters in the world, and the view which burst upon the delighted vision of the travelers was worth going many miles to see.

The summit on which they stood was something over 2,000 feet above sea level, and directly beneath them the two gems of the Adirondacks, Lake Placid and Mirror Lake, glistened in the afternoon sunshine of a beautiful Autumn day.

The air was wonderfully clear and crisp, and in a complete circle, as far as the eye could reach, the snow-capped summits of the highest peaks in the Adirondacks stretched away in magnificent outline.

No better time could possibly have been selected to show the natural beauties of the scene. The snow which crowned the summits of the highest peaks had fallen two nights before, and made a fitting crown to the gorgeous mantle of many-colored foliage which covered the slopes of those old monarchs of the earth, and the party gazed and gazed in wondering admiration at the panorama spread out before them. It was hard to break away and return to the prosaic surroundings of every-day life, but the train was waiting to take them back to Saranac, and supper was at the other end of the line, so finally, but it must be confessed reluctantly, this enchanted region of the clouds was left to solitude and the stars.

The run back to Saranac was quickly covered and after another hearty meal the homeward journey was resumed.

The night run over the splendidly ballasted roadbed of the New York Central Railroad was accomplished smoothly and without incident, and the train pulled into the Grand Central station on Saturday morning, after a trip which will long remain a pleasant reminiscence of the Montreal convention.

PERSONAL MENTION.

The Solar Carbon Company, of Pittsburgh, was well represented by General Agent Webb.

Mr. J. H. Rhotehamel found many friends of the Columbia incandescent lamp at the convention.

T. Euphrat, of Darien, Conn., showed a line of improved trolley ice cutters, trolley wheels and forks.

Probably two of the most widely-acquainted gentlemen present were John A. Brill and W. H. Huelings, of the Brill company, of Philadelphia.

The American Rail Joint and Manufacturing Company, of Cleveland, Ohio, were represented by G. D. Claflin, Jr., and exhibited numerous samples of their joints.

W. B. Cleveland, of the Forest City Electrical Works, was a quiet observer of the convention. Mr. Cleveland, although a young man, is one of the pioneers in electrical work.

The Taunton Locomotive Manufacturing Company, of Taunton, Mass., showed two of their heavy duty snowplows, which were in charge of Wendell & MacDuffie, of New York.

Mr. Cyrus O. Baker, Jr., master of transportation of the National Electric Light Association, was present in his customary genial spirits getting points on transportation. Mr. Baker also refines and imports platinum.

Major H. C. Evans, of the Johnson Company, was shaking hands with a multitude of friends at the convention. A street railway convention without the Major would be like the play of Hamlet with the hero absent.

Mr. N. C. Garey, district superintendent of the Wagner Palace Car Company, made the run from Montreal with the special carrying the New York delegation and did everything possible for the comfort of the party.

The Studebaker Bros. Manufacturing Company, of South Bend, Ind., distributed interesting descriptions and illustrations of their new street sprinkler. The splendid quality of the work of this company is well known.

The American Railway Supply Company, of New York, made a very attractive display of metal badges and buttons for street railway employés. Mr. Walter Chur, general manager, added to his popularity by distributing one of the neatest little souvenirs of the convention in the shape of aluminum valise tags.

Mr. G. D. Claflin, Jr., representing the American Rail Joint and Manufacturing Company, of Cleveland, Ohio, was in attendance, as was also Mr. F. E. Huntress, of Boston, representing the Walker Manufacturing Company in the East, the Barney & Smith Car Company, and the Neal Electric Headlight Company.

The Stirling Supply & Manufacturing Company, of New York, exhibited a line of their fare registers and overhead material, as well as wheel guards and fenders. They were represented by J. J. Kennely, superintendent; C. M. Rummill and G. S. Millen. Mr. J. H. Carson was also present and met scores of friends.

The Canada Switch and Spring Company, of Montreal, showed a steel truck equipped with Meneely tubular bearings and loaded with six tons of rails. This represented the ordinary full load of a truck and the value of the bearing was illustrated by the ease with which it could be moved backward and forward over the rails by hand with little or no exertion.

Among the many well-known faces who carried their exhibits under their hats were noted Alonzo W. Paige, president of the Paige Iron Works, of Chicago, and his very able assistant, E. S. Nethercut, engineer of the concern. Both gentlemen had considerable to say about some excellent work in track and switch construction which they have recently installed for the Metropolitan West Side Elevated Railroad Company, of Chicago.

Among the General Electric representatives were F. M. Kimball, P. L. Saltonstall, C. C. Pearce, P. Hodges, of Boston; W. B. Potter, L. Dunbar Tandy, A. S. Heywood, of Schenectady; R. H. Beach, A. K. Baylor, W. G. Bushnell, Elmer P. Morris, of New York; H. J. Crowley, of Philadelphia; S. W. Trawick, of Atlanta; F. H. Strieby, of Cincinnati; F. C. Todd, of Baltimore; T. H. Fearey, of Buffalo; G. D. Rosenthal, St. Louis; represented the factory and the district offices east of the Mississippi.

The Charles Scott Spring Company, of Philadelphia, offered a very complete and attractive exhibit of their complete line of springs for every kind of electric railway work. This concern, by the way, are the largest manufacturers of these goods in the United States. They were ably represented by Charles Scott, Jr., Harry C. Johnston, and William H. Hansell, manager street railway department, all of Philadelphia. These gentlemen were kept busy distributing souvenirs in the shape of bill-folds made from the finest pig skin, which were in great demand.

THE CRANDALL ELECTRIC SIGNAL.

A PROMISING INVENTION FOR USE ON SEA OR LAND.

The Crandall electric signal is a recent invention of Mr. L. S. Crandall, the well-known typewriter inventor. It is, in fact, a sort of typewriter delivering its message, letter by letter, in mid-air or at any distant point in gigantic characters of light. The observer may be miles away and yet read the message with ease.

The keyboard is manipulated precisely as in an ordinary typewriter and its function is to switch in, or direct the current through, a series of distributing wires which are carried in a cable to the monogram or display frame. According to a predetermined scheme the keys exercise a selective function and each one switches in the leading wires only, which connect with the members of the monogram constituting the letter of the alphabet which that particular key represents. By reference to the monogram, bearing in mind that each line of lamps in it is a member capable of separate electrical excitation, the reader may easily trace any letter of the alphabet in form so nearly conventional as to be readily understood. Thus, if on the keyboard the A button is pressed the lamps of all the members of the monogram entering into that letter shine out simultaneously, while all other lamps upon the display frame remain dead. And so on for every letter. The observer has only to follow the letters as they flash out one after another to spell out the words of the message. It will be seen that this is a sort of visual telegraph and that it may be made to talk in almost any language spoken by man. It is also serviceable for cipher writing according to any prearranged code.

Its utility for advertising purposes will be seen at a glance. It is also probably an excellent system of night signaling for naval vessels, steamships, yachts, etc.

Commissions appointed by both the Army and Navy Departments of the government have viewed it and reported favorably upon it, and it is confidently expected that it will supersede the present electrical signaling service of the navies of this and other countries. The life saving service has endorsed it, as has also the signal service of the United States Army and the New York State Militia.

The device is patented in this and all desirable foreign countries, and an organization has been effected for its ownership and management under the name of the Crandall Electric Signal Company, whose principal office is in the Kellogg Building, Washington, D. C., with Hon. Chas. S. Manderson, Senator from Nebraska, as president.

The display frame, shown in Fig. 1, may, of course, be made any desired size, the distance at which the letters are visible being dependent upon this and upon the candle-power of the lamps used. Fig. 1 shows in a greatly reduced form a frame five feet high by three and one-half feet wide, equipped with 16 candle-power lamps. Signals flashed from this frame are visible with the naked eye for distances from one to three miles, depending on the weather. With a glass the signals may be easily read up to 10 miles.

The novelty and utility of the Crandall electric signal should assure it a brilliant future.

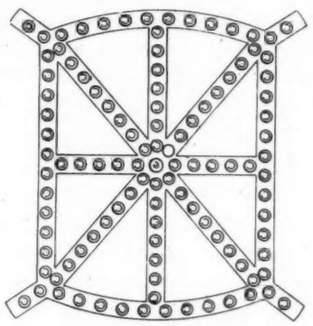


FIG. 1.—MONOGRAM DISPLAY FRAME, CRANDALL ELECTRIC SIGNAL.

Steam Railway Men Favor Electric Power for Suburban Lines.

The American Society of Railroad Superintendents held its 25th annual meeting in New York city, recently. President George W. Beach, of the Naugatuck division of the New York, New Haven & Hartford Railroad, presided. Colonel Henry G. Prout talked at length on "Electricity on the Railroads and Its Problems." He said the trolley in suburban service was a rival of the railroads, and instanced the trolley running between St. Paul and Minneapolis, which covered the distance in 50 minutes for 15 cents. The steam railroads covered the distance in half the time, but charged 25 cents. He advised that for suburban service the railroads run trolleys.

Another victory for electricity is to be found in the annual report of the New York, New Haven & Hartford Railroad, which says that the success of the electrical experiments on the Old Colony division has been so satisfactory that the new motive power "will be promptly adopted at other points on its lines."

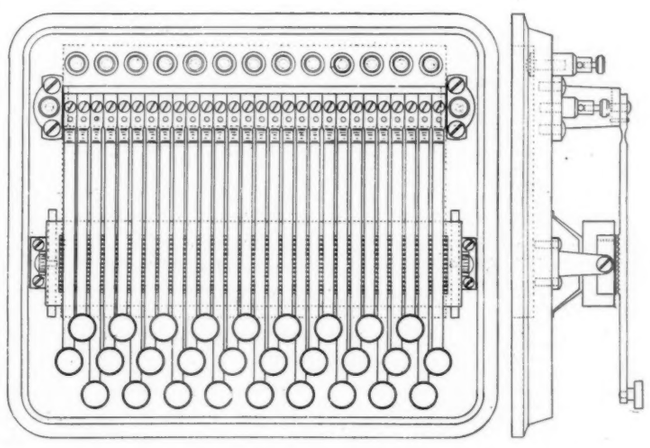


FIG. 2.—PLAN AND SECTION OF OPERATING KEYBOARD, CRANDALL ELECTRIC SIGNAL. DIAGRAM ABOUT ONE-THIRD ACTUAL SIZE.

The Detroit Railway.

Mr. Charles L. Pack, the well-known street railway man of Cleveland, Ohio, was found at the Holland House, New York, one evening last week by a representative of the ELECTRICAL REVIEW. Mr. Pack, with his father, his uncle and other capitalists has made a heavy investment in establishing the recently built Detroit Railway, in Detroit, Mich. In speaking of this road, Mr. Pack said:

"Our company was granted very valuable rights in Detroit on December 4, 1894. Since then we have constructed $47\frac{18}{100}$ miles of railway. The rail is 77 pounds to the yard. Our ties are laid in concrete and cement. Our franchises cover about 20 miles in addition to the $47\frac{18}{100}$ miles built, a part of which is now in operation. The balance will be in operation by November 1. Our power house is on a fine piece of real estate fronting on the Detroit River. We get coal by either rail or water, and free water from the Detroit River. Our power is sufficient to run 200 cars; at present we have 75 cars—more ordered. We have no mortgage or bonds as yet. Our capital stock authorized is $1,000,000. Our stockholders have paid in in money since December 4, 1894, $1,000,000.

"Yes, our road is known as the 'three-cent' line—referring to the fare, of course. We sell eight tickets for a quarter up to seven o'clock in the evening. Our cash fare is five cents. The receipts of cash fares average about 22½ per cent of the total receipts. By complying with the wishes of the city authorities and allowing the eight-tickets-for-a-quarter fare, we are relieved from paying into the city treasury any part of our income. We are, however, required to restore the paving according to the city's specifications, on any streets we tear up in laying our tracks. We are under no further obligations to the city than this.

"Our road, we think, is just as well built as it is possible to have it to-day. Our longest line, at present, is four and one-half miles, and as our lines radiate from the center of the city and seldom cross each other, we have no transfer system. We have put our money into this road as an investment which we believe will afford us fair returns."

The board of directors of the Detroit Railway is composed of George W. Pack, president; H. A. Everett, vice-president and manager; Albert Pack, secretary and treasurer; Chas. W. Wason and Chas. L. Pack.

Our Slow-coach Elevated.

[*From the New York World.*]

In an interview in the ELECTRICAL REVIEW Colonel Hain denies the report that the elevated railroad company intends to introduce electric traction in its system either "next year or during the next two or three years." In reply to a further question the manager of the elevated roads expressed little faith in the revolutionary development of electric power for transportation purposes.

We do Colonel Hain's intelligence the credit of believing that it was George Gould's and Russell Sage's pocketbooks that spoke in this interview, and not the engineer who is managing their roads. Colonel Hain has seen the underground trolley successfully applied in this city. He has seen his old-fashioned roads on stilts lose 15,000,000 passengers in a year to the cable lines. He has inspected, personally or by proxy, an elevated road in Chicago running by electric traction far faster and more steadily than his puffing little locomotive nuisances can draw his trains, and with their cars brilliantly lighted and comfortably warmed by electricity. He, of course, knows of the wonderful growth of the trolley lines and of the remarkable achievements with the electric locomotives in the Baltimore tunnel.

The truth is that electricity is already firmly established for motive, light and heating purposes. Our elevated roads have not utilized it because the management is too stingy, shortsighted and Bourbonish to improve their property by improving their service.

Has the Elevated Road Lost Pluck?

[*Joseph Howard, Jr., in the New York Recorder.*]

"Colonal Hain says electricity is not likely to be used next year nor for many years to come on the elevated road."—Report.

Jay Gould told me, at least eight years ago, of his great interest in electric experiments and the progress made by experts in the use of this marvelous fluid. Jay Gould, unfortunately, is gone, but the property remains. Is it possible that Jay took with him all the pluck and enterprise and esprit of the overpaid corporation?

The plant of the New Berlin, N. Y., Electric Light Company, which had been in operation only about two years, was recently destroyed by fire with a loss of $15,000. Other recent losses by fire were the lighting plant at Walsenburg, Colo., loss $6,000, and the plant at Brazil, Ind., loss $5,000 with $400 insurance.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, OCT. 30, 1895.

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The telephone business seems to be humming along right merrily, despite the numerous and ponderous legal questions involved. This branch of the electrical field is at all times lively and interesting.

The paper on "The Rating and Behavior of Fuse Wires," by Professor Stine and his associates, the first instalment of which appears on another page, will be found to be an interesting contribution to the literature on the thermal cut-out.

We publish in this issue a biographical sketch and an appreciative estimate of the character of the late Franklin L. Pope. None of the many able workers in the electrical field was more highly esteemed for his mental attainments than Mr. Pope.

The question of brakes is a most important one to street railway managers. The old hand-power brake is still in use on the majority of roads and street railway men seem to be waiting for their neighbors to try experiments with the electric and air brakes now on the market. There is no doubt that some form of mechanical or electrical brake will ultimately be universally used.

Reports from a considerable number of electrical manufacturers show that business in the electrical field generally is in pretty good shape. Several factories are working overtime and others have trouble to keep pace with their orders. The incandescent lamp business is good and consumers are beginning to believe that good lamps cannot be made for nothing; they are buying the good lamps. Manufacturers of arc lamps are especially active and several new types have recently made their appearance. The insulated wire manufacturers are as busy as bees. It is very difficult to buy steel rails for immediate delivery, and the rolling mills are reaping a harvest.

Although the class of labor now employed by electric light, railway and power companies is of a much higher order of intelligence than could be obtained a few years ago, there is still room for improvement. We think it would be financially beneficial to such companies to open schools of instruction for all employés engaged in attending or handling machinery and apparatus. The sessions of such a school could be held in the evening and we think most of the men would be glad to attend. If this is found not to be the case, it might prove profitable to pay the men regular wages for the time so spent; or make such attendance compulsory before employment is given. Green men in charge of delicate or high-priced machinery are an expensive luxury.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

Stocks and bonds were quiet all the week. Transactions were mostly of a professional character, consisting largely of short sales on one day and covering on the next. Very little net change occurred in prices. The waiting policy of capitalists, so characteristic last week, was again in evidence. The only factor of a general nature influencing speculation was the movement in exchange. This fluctuated within a range of 1 per cent several times within 10 days. Upon each approach towards the gold exporting point securities were depressed, and upon each reaction short contracts were covered. This rendered the market narrow and indicated that owners of securities are in control. They are not expected to make any move beyond steadying prices until after the election. Trade reviews show a volume of business equal to that of last week and very nearly as great as in the corresponding period in the prosperous year of 1892. Prices of staples, as a rule, have either hardened at recent advances or still further appreciated. Coal has advanced some 40 cents a ton and is now higher than at any time in 18 months. Iron under a good railroad demand recovered its losses of a week or two back.

There have been startling developments in the electric-financial world in the last week or 10 days, in connection with the expansion of the Electric Storage Battery's field of operations. Two weeks ago the ELECTRICAL REVIEW pointed out that this company proposed through the agency of sub-companies to utilize the generating power of existing electrical plants, during the 16 to 18 hours of the 24 when they are usually idle. The policy took definite shape this week through a lease by the Pennsylvania Heat, Light and Power Company (a subcorporation of the Electric Storage Battery Company) of the Edison Electric Illuminating Company of Philadelphia for 8 per cent per annum for two years and 9 per cent for 97 years thereafter. This will provide all the generating power required at present for charging batteries. It will not interfere with the direct lighting business of the illuminating company. It is estimated that some half-dozen of the other Philadelphia companies, among them the Brush, Suburban, Diamond, Manufacturers', Powelton and Columbia may in time be subsidized in the same way, giving the Electric Storage Battery control of the electric lighting of Philadelphia. Citizens need not fear an increase in the cost, as the fundamental idea of the Storage Battery people is to increase revenues by reducing the price, and thus inducing an increase in consumption. They propose to make increases in earnings by utilizing present plant investments, and consequently without a proportionate additional outlay. Developments in Philadelphia are to be followed in other large cities, and it is understood that New York and

Brooklyn will be the next to receive attention. This ought to have a direct bearing on the value of securities of the illuminating properties in the various large cities of the United States. In the first 15 minutes of business on the Philadelphia Stock Exchange, after the deal above set forth was announced, the illuminating stock advanced 12 points, and the $5 paid receipts of the Pennsylvania Heat, Light and Power Company went to 16½ from 5½. The Storage Battery stock gained two per cent.

Important developments in other branches of the electric storage battery field are also taking place. The Manhattan Elevated of this city is to equip its Thirty-fourth street ferry branch with the cells for a test, with a view of more general adoption on its lines. This week a contract for 1,000 cells, involving a profit to the battery company, was closed. Another large contract with the Cataract Construction Company has been negotiated. The company proposes to erect a large manufactory at Niagara Falls to supply its western trade.

Edison Electric Illuminating Company of Boston declared a quarterly dividend of 1¾ per cent, payable October 26. Books close October 23 and reopen November 3.

The New England Telephone and Telegraph Company declared a dividend of 1¼ per cent, payable November 15 to stock of record October 31.

Thomson-Houston Trust securities, series D, will receive, November 1, 12 cents per share semi-annual dividend. Books close October 26 and reopen November 1.

General Electric was subjected to the same market influences as the balance of the list, going from 37 on Monday to 35⅝ on Thursday, recovering a part of its loss on Friday and reacting with the balance of the market on Saturday. The bonds were quoted at 92. The company's strike at Lynn is still unsettled and is interfering with operations in the departments.

The Edison Electric Illuminating Company of New York bonds were more than usually active, the new 5's selling at 103 @ 103¼ and the old 5's at 108½ @ 109. The stock was traded in at 98.

On the Boston Exchange Bell Telephone was unchanged at 197½@ 198. New England Telephone was neglected at 89 @ 88. Westinghouse was practically unchanged at 35½ @ 36 for the common and 55 @ 55¼ for the preferred. Erie Telephone hardened at its recent advance. Closing quotations were 67½ @ 68⅝. The low of the year was recorded on February 13, it being 45½. The highest was 69¾ on October 16.

On the Philadelphia Exchange, Storage Battery was as active as usual. The common shows a reaction of 2 per cent and the preferred a like amount on profit taking. BAIN.

New York, October 26.

The Nassau Electric Railway Company, of Brooklyn, N. Y., wants a direct route to the Brooklyn Bridge, and has offered to purchase the De Kalb avenue line. It is said that the offer will be considered.

Answers of Boston Telephone Companies in Bell Suits.

The answer of the National Telephone Company, of Boston, to the suit for infringement brought against them by the Bell company under the Berliner patent, was filed in the United States Circuit Court, at Boston, on the 15th instant, as before noted in these columns.

The answer of the National company is a very voluminous document, covering 21 pages of legal cap and denying each and every item in the Bell company's bill of complaint in positive language, accompanied by excellent reasons therefor.

Indeed they go further than this, and after disposing of every clause in the complaint, carry the war into Africa, so to speak, by declaring the utter invalidity of the so-called Berliner patent. In support of this they bring an abundance of evidence, citing among other things five United States patents covering the alleged invention, the constant contact variable pressure transmitter or microphone, or substantial and material parts thereof, as well as others in Great Britain, Canada, France, Belgium, Italy and Spain, all prior to the issue of the Berliner patent.

Evidence on these points, as well as to the effect that the invention was fully known, published and in use prior to the application for the Berliner patent, is given in abundance and altogether the answer constitutes a remarkably strong and aggressive document, which will furnish food for considerable reflection on the part of the United States Circuit Court, if the matter ever progresses beyond its present stage.

The answers of the Thompson-Brown Electric Company and the Century Telephone Company, both of Boston, have also been filed with the court, one on the 21st instant and the other on the 23d, and cover substantially the same ground as that taken by the National company.

Here the matter rests until such time as it shall be taken up by the court, which is likely to be in the somewhat distant future, as it is improbable that any Circuit Court judge would care to pass upon the matter of an injunction pending the decision of the Supreme Court in the government's appeal and on which decision hinges the validity of the patent.

In the meantime telephone interests are booming, and the field of development widening day by day, with every confidence of finally overcoming all obstacles. H. G. T.

Boston, October 26.

The Hoboken, N. J., Common Council have granted a franchise to the Hoboken Railroad, Warehouse and Steamship Connecting Company to operate an electric freight railway within the limits of the city. The object of the company is to run a freight line along the river front, so as to give direct communication between the various steamship lines, the warehouses along the river front and the principal railroads. The company gave to the city in return for the franchise a tract of land which will be converted into a public park.

OUR CANADIAN LETTER.

ROSSLAND, B. C.—J. E. Saucier is endeavoring to float an electric light and power project.

HANOVER, ONT.—D. Knechtel, of this place, proposes to put in an electric light plant at Maple Hill.

VICTORIA, B. C.—The local government is calling for tenders for electric light wiring at the new Parliament buildings.

ARTHUR, ONT.—The Council are prepared to grant a franchise to light the streets by electricity. Address J. M. Roach, village clerk.

BARRIE, ONT.—The Barrie & Allandale Electric Street Railway Company has been incorporated with a capital stock of $50,000 to build a street railway in this town.

COBOURG, ONT.—P. Randall, the promoter of the proposed electric railway between Cobourg and Port Hope, states that $40,000 of stock has already been subscribed.

VANCOUVER, B. C.—H. H. Van Every is reported to have been offered a bonus of $600,000 by the cities of Vancouver and New Westminster to construct an electric railway 15 miles in length.

ST. THOMAS, ONT.—The committee appointed by the City Council to report on the construction of an electric railway have recommended the construction of a subway at Ross street and a bridge at Hinks street.

FRASERVILLE, QUE.—The Fraserville Electric Power Company is applying for incorporation to operate telephones and contract for electric lighting. Capital, $25,000. N. G. Peltier and P. E. Granbois, M. P., are among the promoters.

ST. THOMAS, ONT.—The directors of the St. Thomas Street Railway Company last week went over the proposed routes of the electric railway with a committee of the City Council. It is hoped to commence construction in the near future.

MONTREAL, QUE.—The Montreal Park and Island Railway Company will extend their line to St. Laurent, a distance of seven miles. Engineers are now surveying the route and construction work will probably be commenced this Fall.

LUNENBURG, N. S.—It is reported that parties have bonded the water-power known as Bang's Falls on the Medway River and propose to erect two or three pulp mills and build an electric railway to Port Medway for the purpose of carrying the pulp to a port of shipment. An engineer has recently been examining the route.

RAT PORTAGE, ONT.—Mr. Rutherford, chief engineer of the Canadian General Electric Company, of Toronto, recently made an inspection of the electrical possibilities of this place, visiting the Keewatin Power Company's dam, the Citizen's electric power house, the reduction works, for which an electrical transmission plant of 100 horse-power to run the mill is wanted, and the Sultana mine.

OTTAWA, ONT.—The Ottawa Auer Light Company has applied to the Toronto Government for incorporation, the amount of the capital stock to be $30,000. The company propose to erect and operate works in this city for generating and producing electric light and heat for illuminating and heating purposes, and among the promoters are Mr. Granger, manufacturer, of Montreal; W. S. Thompson, of Toronto, and W. T. Andrews, of Hamilton.

SCHOMBERG, N. B.—The construction of an electric railway from this place to connect with the Grand Trunk in either King, Aurora or Newmarket, which has been agitated for some time, seems now likely to be carried out, a Scotch company of good financial standing having taken hold of the matter. Recently a surveyor, engineer and a prominent railway contractor went over the proposed routes with a view to deciding on the most suitable one, but as yet no decision has been made public.

ST. CATHERINES, ONT.—The City Council have passed a resolution asking the government to grant letters patent to the Lincoln Street Railway Traction and Light Company. It is supposed to be the intention of the company to convert the Niagara Central Railway into an electric road and extend it to Beamsville, there to connect with the H. G. & B. line. The parties asking incorporation are Messrs. William Wilson, George Palmer, R. H. Hill, H. A. King, George E. Patterson and Dr. Oille.

J. A. C.

Montreal, October 25, 1895.

PERSONAL.

Mr. Frank B. Parsons, of Boston, made a short visit to New York last week.

Mr. Burns, of the American Electric Telephone Company, Kokomo, Ind., was among last week's visitors to New York city.

President Russell B. Harrison, of the Terre Haute, Ind., Electric Railway Company, visited New York last week and made a welcome call at the ELECTRICAL REVIEW office.

Mr. W. A. Stadelman, New York manager for the Brown Hoisting and Conveying Machine Company and the Elwell-Parker Electric Company of America, has returned to the city after a trip to Chicago and other western points.

Mr. Franck Z. Maguire, who has been very successful in the introduction of Edison's kinetoscope and kinetophone in Europe, arrived in New York city last Saturday on the "St. Paul." Mr. Maguire will be in this country about three weeks.

Mr. George Le Roux, engineer-in-chief of La Campania Primativa de Gas de Buenos Ayres, South America, is visiting this country and investigating the latest features in the electrical industry. Mr. Le Roux bears letters to a number of our leading electrical people, and the ELECTRICAL REVIEW bespeaks for him a courteous reception.

Canal Trolley Tested.

The Lamb system of operating canal boats by an electric motor traveling on a suspended cable was tested last Saturday on a line a little over a mile long erected on the south bank of the Erie canal at Tonawanda, N. Y. Power to operate it was obtained from the Buffalo-Niagara Falls electric railway station, and the efficiency it manifested pleased everybody who saw the test.

THE PRESENT STATUS OF THE AIR-BRAKE.

READ BEFORE THE AMERICAN STREET RAILWAY ASSOCIATION, MONTREAL, OCTOBER 15, 1895, BY E. J. WESSELS.

Last October the speaker had the honor to lay before the members of the American Street Railway Association in Atlanta a paper on the subject of "Power-Brakes *vs.* Hand-Brakes." In that paper reference was made to the advantages of a good air-brake and the desirability of its adoption on roads with congested traffic, high speed or severe grades, and especially where trailers were used.

At that time the street railway air-brake was in swaddling clothes. Some, not positively indifferent on the subject, proved hostile. When asked their objection to its adoption they generally answered, "The air-brake costs too much." Some of the members asserted that hand-brakes answered their purpose and they saw no need for substituting air-brakes. The speaker claimed that every car should have both air and hand-brakes.

To contend against this opposition has not been easy. It takes a long time to convince some men that first cost may not mean much and often in reality proves but a forerunner of excessive outlay. *Per contra*, sometimes things said at the start to "cost too much" are *cheapest* in the last analysis. Prices must be judged by relative values and mean nothing unless one *sees* the apparatus.

In considering the present status of the air-brake it is pleasing to notice that the indifference which existed even in the influential quarters has largely disappeared. Months ago a prominent railway president asserted that he would not put an air-brake on his road because, if he did, there would be nothing for his motormen to do. Since then he changed his mind and recently contracted to have every car on his road equipped with air-brakes.

It was asserted in the speaker's Atlanta paper, and may be proper to repeat here, that the object of the present paper is not to advertise any special make of air-brake, but to call attention to air-brakes in general, applicable to passenger and freight, electric and cable cars.

Most managers now concede that the old form of hand-brake will no longer answer for heavy, double-truck, high-speed cars. There has been a remarkable change of views since we last met. It is now admitted that more reliable braking apparatus must be secured. In fact in several quarters even the question of expense cannot be said to be the chief one. Some go so far as to say "we must have better brakes at any price."

There are instances on record where certain roads have contracted for more reliable braking apparatus at a cost which a year ago they regarded prohibitory. In their extremity these roads naturally turned to those manufacturers who have made air-brakes a study.

It is manifestly unadvisable for a street railway company to turn out its own brakes. The question is such a difficult one, the outlay for experiments is necessarily so immense, that no individual road is justified in undertaking the business. Some roads build their own rolling stock, but it is easier to build cars than air-brakes.

An air-brake which has merely been tested in the *shops* is of doubtful utility. It cannot be depended upon for the rough usage it will encounter in service. No air-brake is fit to be mounted on a car, which has not gone through the most crucial tests based on records of similar brakes operated on cars for many months.

To design an air-brake which shall be mechanical, durable and economical is one of the most difficult problems a manufacturer can face. It is comparatively easy to design apparatus which will work admirably if left undisturbed in the shops; but that same apparatus, when transferred under a car, in a short time may be battered beyond recognition.

The street car air brake has much to contend with:

1. The unfamiliarity of the average motorman with the proper use of air is greatly against it.

2. The compressor is begrudged space on the car axle, although generous space is freely given to electric motors irrespective of dimensions. This makes it difficult to have proper bearing surfaces.

3. The neglect of proper inspection is greatly against the air-brake. Even motors do not receive the attention they should, as many a scrap heap testifies. The air-brake hardly receives any.

4. Insufficient lubrication. The same man who lubricates his motors passes by the air-brake without using his oil can. Probably he might neglect to oil the motors, but he knows that failure to do so would be speedily detected and render him liable to discipline. The air-brake has not reached that point in street railway operation where neglect to lubricate it produces like results. The most perfect apparatus ever designed, if neglected, cannot do its work properly, and no automatic oiling machine or mechanism under a car can possibly replace human vigilance.

A year ago the air-brake was not found on many roads. On the few roads where it was being used, satisfactory results were obtained, and in the *Street Railway Journal* for March last, in the article entitled "The Street Railway System of Buffalo, N. Y.," a report of the successful operation of air-brakes there will be found. It showed that by using air-brakes there had been a great saving in wheels. As a matter of fact, there should not be any flat wheels, if air-brakes are properly used, for by their aid pressure can be regulated to a nicety.

Any good brake is better than a poor one, and we welcome into the family our friends who since last convention have put on the market several excellent types of mechanical brakes.

As, however, in street railway practice we are closely following (if not really leaving behind) steam practice, it is reasonable to conclude that if mechanical brakes were the solution of the braking problem, they would be found on steam roads instead of the well-known Westinghouse air-brake. An examination of the Patent Office records discloses the fact that scores of patents have been granted for mechanical brakes for steam cars, but one would have to travel far to find a solitary mechanical brake in service on steam roads. If they have proved unfitted for steam practice, and the air-brake has been adopted, it is fair to assume that mechanical brakes may not be all that is required for braking electric and cable cars. It is always better to replace human muscle by some controlable, potent force, and compressed air, under proper conditions, seems to be that ideal force.

The speaker recently returned from an extended trip through Europe. He rode on hundreds of cars in different places, from the north of England to Buda Pesth, but did not find a brake on any steam road operated by anything but air, vacuum or steam. Investigation proved that air-brakes were much preferred to all other forms. Some trains used the automatic, some the non-automatic. He also found that inspection on most lines was ideal. Not only were the brakes tested, as we test them here, but on many of the trucks diagrams were painted with the words, "to be lubricated every so many days." It was the duty of the car tender to chalk in the squares painted underneath the days when apparatus received attention.

The street car air-brake has been adopted by the Australian Government; it has been specified by borough engineers in Great Britain; it is being installed in different places on the Continent. It is, therefore, somewhat discouraging to find that while the street car air-brake receives very careful attention abroad it is denied that attention here. It is unfortunate that our managers entrust it to uninstructed men who have had no experience in its use. No one anywhere would be permitted to handle the Westinghouse triple valve who had not served his apprenticeship of from three years upward, and firemen are not allowed to touch it. The locomotive runner alone is entrusted with it and held strictly accountable for its misuse. More than one runner has been discharged for bad use of his pressure.

The street railway air-brake is entrusted to green men who sometimes don't know enough to use their electrical apparatus properly.

The air-brake for steam roads has undergone an evolution beginning in 1869. Even its most ardent supporters will not claim that the system as applied to-day is absolutely perfect; but it is *commercial*, and unquestionably has saved hundreds of lives in the past 27 years.

If it has taken that long to bring the present steam car air-brake to a measurable degree of perfection, what may we not hope to see accomplished by the street railway air-brake in a very much shorter time?

There is a book which has reached a third edition entitled "Diseases of the Air-Brake System: Causes, Symptoms and Cure," devoted exclusively to steam road air-brakes. This too, after 27 years' experience. Should we expect perfection in the more youthful street railway air-brake, which has only been in existence for some three years?

The duties required of a street railway air-brake are more severe than those demanded of a steam-car air-brake. The steam train makes very few stops. The stations are well known and the roads are provided with proper gate crossings and the block system. In numerous places, grade crossings have been or are being abolished. Even the engineers of the Empire State Express do not face the risks to which the motorman of a fast suburban electric train is constantly exposed. The electric train very often stops where there are no stations, where passengers stand between the rails frantically waving so they will not be left. There being no definite time when the train passes crossroads, the motorman of the electric train is menaced by farm wagons and other vehicles, deaf people, bicycle riders and others who would not attempt to cross the track if the Empire State or other express was due.

It is placing a motorman at fearful disadvantage to entrust him with a 25-mile-an-hour (and more) train, as is now being done, and fail to provide him with the necessary means for emergency stops!

The air-brake is the only brake which has an emergency stop that can be instantly applied by the easy turning of a handle. Other brakes require muscular effort and generally a number of turns before the braking power becomes effectual. In order to have even an approach to an emergency stop, it is generally necessary with hand-brakes to gear them to a point which they would never reach were the semblance of such a stop not required. This excessive gearing means rapid wearing of parts and needless tiring of muscles.

It is not claimed that the street railway air-brake has reached perfection. It is believed it never will reach that point unless through the co-operation of the railway managers. But even though it is not claimed that the present street railway air-brake is all it should be, we must admit it has made remarkable strides, that satisfactory results have been produced, and that it is commercial. It will not be possible to overcome all the objections to an air-brake unless managers rally around the men who are striving to reach perfection. It is only by braking cars in actual service that important knowledge of the air-brake can be gained. There were air-brakes which entered the lists at the last convention, which have retired from the field, but some are still bearing the heat and burden of the day. It is a case of the survival of the fittest; but even if an absolutely perfect air-brake was in existence, it would stand in jeopardy every hour, so long as an uninstructed motorman is permitted to handle the controller.

Those of us in the midst of the conflict do not despair of being able to turn out an ideal air-brake which will operate satisfactorily under all conditions. If that brake could be delivered to-day and would pass muster before a jury of microscopists, there still would be the factor of neglect and inattention of motormen to contend with.

We may not in this stage of the art expect that leading roads will maintain schools of instructions, nor can the manufacturer of air-brakes, from the low selling price, support such institutions; but surely it is reasonable for them to expect that motormen should undergo preliminary instructions, and that the simple operating directions shall be faithfully adhered to.

When a man applies for admission to the police force he must undergo a severe examination. One of the questions recently asked was: "If there were 4,796 persons in a district and there is one Swede to every three Germans and five Irish, how many Swedes, Germans and Irish are there in that district?" If this sort of an examination is required of policemen, should not suitable tests be applied to motormen?

The speaker recently read a letter from which the following is quoted as giving evidence of what the air-brake has to contend with in some places:

"This is by all odds the dirtiest city in the world. Our men are of the lowest degree of human intelligence, utterly incapable of understanding or taking care of any kind of machinery. We are unable at times to keep our cars on the road for lack of motormen. Another difficulty is the possibility of braking a car with current on. Our men are also incapable of appreciating that a little is frequently enough and almost invariably bring the car to a full stop when they only wish to slow down."

Fortunately in the United States such a deplorable lack of intelligence does not exist. Our motormen are far more intelligent and the recent

prolonged financial depression has enabled managers to secure better men than were formerly obtainable. It is gratifying to find that many motormen are anxious to improve their condition and to become more useful to their employers. Many of them send in requests for literature so they may have a more intelligent idea of the apparatus entrusted to them. While this is true of many, we cannot overlook the fact that there are others not so desirable, men who have little ambition and who expect to remain motormen as long as they are able to turn a handle. These claim they render a fair equivalent in work for the wages paid. They forget that the way to secure higher wages is first to show greater proficiency. They remind one of the brakeman who was complained of by passengers for not announcing stations distinctly. His defense was that he could not be expected to sing tenor for $30 a month.

The cry about trolley slaughter has subsided. Six months ago it had reached large proportions, but the riding public is beginning to realize that, even if managers are anxious to minimize accidents, they cannot reach the safety point unless a superior class of apparatus is within their reach.

Since we last met fenders have been made compulsory in several cities. Those who believe most in fenders will not deny that a reliable brake is an absolute necessity. It may be advisable to have both. That is for you to determine. It is probable that air-brakes would have been made compulsory on street railways long ago had the manufacturers of commercial air-brakes devoted their energies to influencing legislation instead of concentrating them wholly upon the perfection of the air-brake. It is, however, extremely probable that before long the air-brake also will be made compulsory, and this is a good argument in favor of testing it in actual service *now*, so that if it becomes compulsory managers will be familiar with its advantages.

The claims of the air-brake over other forms of brakes were fully defined in the Atlanta paper referred to, and need not be repeated. At that time the electric brake was actively opposed to the air-brake. The opposition has since faded away. There has not been, nor is there, an electric trailer brake. If we are to have a reliable electric motor car brake, the brake must apply equally well to trailers. Until the advent of an electric trailer brake, the air-brake must certainly be regarded its superior for train service, especially as the air-brake dispenses entirely with brakemen and gives the motorman absolute control of his train.

Not much is being said about cables, although cable roads in large cities are handling, and probably will handle, vast traffic. The use of the combined air-grip and brake device on the market means a decided prolongation of the lives of cables with far better brake control than is possible with the levers usually employed.

The street railway air-brake is in a transition state and is going through some of the processes that characterized electric motors. We would not have the superb motors in service today had not manufacturers been able to learn the defects of the pioneer motors through the reports and suggestions of their railway friends.

Fenders, car heaters, lighting systems and other things are now going through these same processes. Hence it is not singular that the air-brake shares the common lot.

The questions to be considered are:

1. Are better brakes than hand-brakes necessary?

2. Will not the demand for better brakes grow even more imperative day by day?

3. Will not some form of power-brake become compulsory ere long?

4. How can the value of any brake (mechanical or otherwise) be judged except by tests in everyday service?

5. How can anything (brake or otherwise) undergo a fair test unless the men who use it are compelled to observe ordinary diligence?

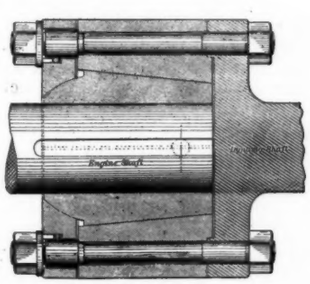
6. How can any movable machinery or apparatus be expected to work satisfactorily unless the moving parts are kept properly lubricated?

Lastly. Can you afford to operate without having a reliable braking system for checking speed or making service and emergency stops?

If you desire to test an air-brake it will not be difficult for you to secure one, and if, perchance, it fails to do all you expect of it, it will be an unwise manufacturer who will not avail himself of any suggestions you may make in the light of your own experience. Let us not forget that your interests and the air-brake manufacturer's are and will always be identical.

A Friction Coupling for Direct-Connected Generators.

The accompanying illustration, reproduced from the *American Machinist*, shows a friction coupling which can be so set that in case the dynamo is short-circuited, the coupling can slip and prevent a burn-out.



A Friction Coupling for Direct-Connected Generators.

This arrangement presents these advantages: The engine and dynamo can be completed separately at the works and combined at the place of installation; can be more easily handled separately than combined, and either can be dismounted without interfering with the other.

The illustration shows a section of the coupling. One-half is a flange forged on the dynamo shaft, and the cone placed on the pulley seat of the engine shaft has a key to prevent it from turning, a pin to prevent working off endwise, and it is split so that the tighter the conical shell is drawn on the tighter the cone grips the shaft. The whole when tightened makes as rigid a job as a solid shaft, with the slip feature added.

General Electric Company's Taxes.

Judge Russell, in the Supreme Court, has vacated an assessment made by the tax commissioners against the personal property of the General Electric Company, the tax being based on a valuation of $3,854,835. It is held that the company has no property in New York city.

FINAL DECISION IN THE REGULATOR PATENT SUIT.

WESTERN ELECTRIC COMPANY WINS ON APPEAL.

The final decision of the United States Circuit Court of Appeals for the Seventh Circuit in the suit of Thomson-Houston Electric Company *vs.* the Western Electric Company and Enos M. Barton, concludes one of the most important patent causes relating to electrical inventions.

In 1879 Elihu Thomson and Edwin J. Houston applied for a patent upon an automatic adjuster for commutator brushes of magneto-electric machines. In this patent the applicants described and claimed a device for automatically adjusting the brushes upon the commutators of dynamo-electric machines, "whereby an automatic adaptation to variations of circuit resistance is secured." This device consisted of a relay adapted to bring into service a motor which shifted the brushes upon the commutator. The relay received its current from an accessory brush placed in advance of the main brush upon the commutator of the dynamo-electric machine.

The patentees of this patent, which was issued as No. 223,659, July 20, 1880, both of them testified that up to the time of taking out of this patent they had not made the invention of current regulation and did not appreciate that the brushes upon the commutator of a dynamo-electric machine could be shifted so as to keep the current constant. Whether this is so or not, the fact remains that it was known to electrical engineers of that date that shifting the brushes upon the commutator of a dynamo-electric machine could be so performed as to keep the current flowing in the circuit constant, notwithstanding the variations of the resistance in the circuit. Weston testified that he had manually shifted the brushes for this purpose from 1876.

It was not long after the issue of this patent, No. 223,659, that Thomson and Houston discovered their failure to cover the device broadly for automatic current regulation. A second application upon substantially the same apparatus was therefore filed and this patent, called generally the "second patent," had broad claims upon automatic brush shifting current regulation. It was this second patent, No. 238,315, upon which suit was brought against the Citizens' Electric Light Company, of Boston, users of Wood arc lighting apparatus. A decision was secured in this suit in August, 1888, sustaining the validity of patent No. 238,315 and finding the defendants, users of the Wood regulator, to be infringers. Suit was subsequently begun against the Western Electric Company in the United States Circuit Court for the Northern District of Illinois, and, after years had been spent in collecting evidence, the case came to hearing in June, 1894, before Judge Grosscup, who rendered an opinion adverse to the patent early in the present year. From this decision of Judge Grosscup the Thomson Houston Electric Company appealed to the Circuit Court of Appeals. The case was elaborately argued in June of the present year and the Circuit Court of Appeals has just handed down its opinion, affirming the decision of Judge Grosscup. The statement of facts occupies some 46 large pages of the opinion of the Court of Appeals and comprises voluminous extracts from the testimony of Mr. Charles E. Scribner, the main witness for the Western Electric Company and one whom the Court of Appeals describes as an expert of conceded intelligence, skill and accuracy.

In addition to the defense which was most strongly urged, namely, that of the first Thomson-Houston patent, No. 223,659, which showed substantially the same device as that of the later patent, No. 238,315, upon which suit was brought, the invention of Maxim of an automatic current regulator for dynamo-electric machines which was applied to separately excited dynamos running incandescent lamps in multiple arc was urged as an anticipation of the patent in suit, and this defense also was considered to be adequate to defeat the broad claim of Thomson and Houston for automatic brush-shifting current regulation.

The Western Electric Company defended this case at the expense of much time and money. At the beginning of this litigation, after the decision by Judge Colt sustaining the patent, the outlook for a successful defense was unpromising. The competitors of the Thomson-Houston Electric Company, some of whom were courageous in undertaking patent litigation, almost unanimously preferred to surrender and sell out to the Thomson-Houston Electric Company, or to go out of the electric lighting business, rather than undertake the defense of this suit. The Western Electric Company in conducting this defense, therefore, had to contend not only with the prior decision in favor of the patent, but also with the almost universal acquiescence of the public in the claims of this patent, which claims have now been authoritatively found to be, as the Western Electric Company all along was convinced, unjust and inequitable.

Franklin Institute Lectures.

The Franklin Institute, of Philadelphia, has issued a pamphlet of announcements for the season of 1895-96. Included in the programme of lectures are the following of especial interest to electrical people:

Friday, January 17, 1896, Dr. Louis Duncan, Johns Hopkins University, Baltimore, Md., "The Future of Electricity in Railroad Work." Friday, January 24, Dr. Joseph W. Richards, Lehigh University, South Bethlehem, Pa., "The Electro-Metallurgy of Aluminium." Friday, March 13, Mr. Nelson W. Perry, E.M., New York, "Utilization of the Anthracite Culm Heaps in the Production of Power." Friday, March 20, Prof. F. B. Crocker, Columbia College, New York, "The Exactness of Electrical Engineering." Friday, March 27, Dr. Chas. E. Emery, New York, "The Relations of Electricity to Steam and Water-Power."

OBITUARY.

FRANKLIN LEONARD POPE.

Franklin L. Pope, whose untimely death by electric shock occurred at his residence in Great Barrington, Mass., on the 13th instant, was born December 2, 1840, in the town in which he met death, and within a very short distance of the house where the fatality occurred. The house in which he died was erected in 1766, and his parents removed there when Mr. Pope was still an infant. Within a few years the deceased had reconstructed it on modern plans into an elegant and capacious residence. He was educated in the schools of his native town and at an academy in Amherst. He displayed a marked talent for engineering work, in his boyhood, and was gifted with a skill in drawing which he found of great practical service in his later professional pursuits; indeed, one of the very last things he did was a drawing in a difficult patent case. He became an operator at the office of the American Telegraph Company at Great Barrington when but 17 years of age, an appointment which sought him by reason of his fitness above all the youth of his town. His preferment in this instance, like all of his engagements in after life, sought the man. His boyhood inclinations were also the precursor of his tastes in after life, in a launch made jointly with a schoolmate into journalism by the publication of a small newspaper called the *Berkshire Rambler*. His talent for drawing attracted the attention of the proprietor of the *Scientific American*, and he filled with credit a post on the staff of that journal for a short time, until the great demand for telegraph operators on the outbreak of the war took him to Providence, R. I. While there he made a map of the telegraph service between New York and Boston, which won the admiring attention of the late General Marshall Lefferts, who employed him to make a series of maps of the American telegraph system, embracing all the lines of the seaboard States. In 1864 he was appointed Assistant Engineer of the Russo-American Telegraph Company and personally superintended the survey of part of the route; in this work he was assisted by his brother Ralph and Stephen D. Field, both well known as electrical engineers. He made the first exploration of the territory between the British Columbia border and Alaska. His engagement with this company terminated in a year, the projected route being abandoned by reason of the successful laying of the Atlantic cable.

Subsequently Mr. Pope settled in New York city, where he was engaged as an electrical engineer and expert, and his fame as a master of the rapidly developing science became world-wide. Thomas A. Edison's first business venture in the electrical world was in partnership with Mr. Pope, under the title of Pope & Edison. Together they invented in 1870 the one-wire printing telegraph, the leading principle of which has now come into universal use, in what is now known as the stock "ticker." Mr. Pope invented in 1872 the rail circuit for automatically controlling the electric block system now in general use on railways. He also patented many other improvements relating to railway and telegraphic service.

In 1886 he was elected president of the American Institute of Electrical Engineers, succeeding Dr. Norvin Green, and was for many years editor of the *Electrical Engineer*, of which journal he was always a large stockholder. He also wrote many articles for technical, historical and popular periodicals on various electrical subjects, and was the author of "Modern Practice of the Electric Telegraph" (1871) and "Life and Work of Joseph Henry" (1879). For several years he has been an editor of the *Engineering Magazine*. He was one of the first patent solicitors making electrical inventions a specialty, and for several years held the position of patent attorney for the Western Union Telegraph Company. For several years he had been retained as expert in the most important patent suits brought before the United States Court.

During the draft riots in New York city in 1863, he personally joined together the fragments of the telegraph wires that had been cut by the rioters between New York and Boston. The reconstruction of the Great Barrington electrical plant was one of his recent undertakings, and a work embodying many interesting features that were described in a paper read at the meeting of the Institute at Niagara Falls last June.

Mr. Pope leaves a widow, two daughters and a son. His brother, Ralph W. Pope, is secretary of the American Institute of Electrical Engineers. Another brother, Henry W. Pope, is connected with the American Telephone and Telegraph Company, of New York.

In the death of Mr. Pope electrical science has lost a faithful devotee and able advocate. He was chiefly instrumental in the introduction of the alternating current into this country, having been retained by Geo. Westinghouse, Jr., at the outset of this enterprise on account of his distinguished ability as an electrician and patent adviser. His all-around knowledge of electricity was probably broader in scope than that of any of his contemporaries. He united in the same personality great fertility of invention; an accurate judgment of the commercial aspects of patent property; superior skill as an engineer and versatility of general knowledge. He was a man of commanding intellect. He could grasp an idea half-expressed and often round it to perfection more skillfully than its originator before it was completely disclosed. Many an inventor has triumphed by a timely suggestion from him. His qualities of heart were no less distinctive than those of mind. He was of sunny temperament, sanguine in difficulty, considerate to a fault, indulgent always in efforts to assist others, and exceedingly modest. He was a close student and indefatigable worker; broad in his tastes; he had a strong interest in historical pursuits and did considerable literary work on subjects of this or allied character. As a writer he had a graceful style which always commanded the attention of the reader, and a forceful mode of treatment which left permanent impressions. As a patent solicitor, the profession in which he spent the most active years of his life, his reputation was international; he could inject with rare skill literary grace into a patent specification without emasculating it of its protective value, and his aptness for invention enabled him to forestall infringers by anticipating their lines of evasion and fortifying the patent claim to bar them out. As an expert his ready memory and wide information placed him in the front rank; his qualities were of an order better adapted to guide a case than be led in it. This is what an expert should be, but the latter-day type is more commonly a mere mouth-piece for the legal director. His taste for electrical affairs was dominant throughout his life, and but for the fateful mischance which led to his death his vigorous physique would doubtless have preserved him for many years of distinguished usefulness to his profession.

R. H. R.

John W. Mackay, Jr., eldest son of the bonanza millionaire, was killed in Paris on October 18 by being thrown from a horse. He was born in San Francisco in 1870 and was graduated from one of the Oxford colleges in 1890. He was a director and a member of the Executive Committee of the Commercial Cable Company and the Postal Telegraph Cable Company, in both of which his father is heavily interested.

Gen. Samuel A. Duncan, a well-known patent lawyer of New York city, died suddenly of heart disease at his home in Englewood, N. J., on October 18. He was 57 years old and served in the war with distinction, achieving the rank of brigadier-general. General Duncan had been engaged in numerous electrical patent cases and was well known among electrical people.

New York Young Men's Christian Association's Electrical Lectures.

The Twenty-third street branch of the Young Men's Christian Association of this city is very fortunate in securing as instructor of electrical engineering in their educational department, Frederick M. Pedersen, E. E., assistant engineer of the Crocker-Wheeler Electric Company. A course of 50 lectures will be given on Wednesday and Saturday evenings throughout the Winter. The lectures will be grouped under four general divisions as follows: 1. Introduction: Fundamental units. 2. Sources of electricity. 3. Electrical measurements. 4. Chief commercial applications of electricity.

All young men interested in such a course may obtain full information by applying in person or by letter to the educational director, No. 52 East Twenty-third street, New York city.

An Electrical Separator Wanted.

TO THE EDITOR OF ELECTRICAL REVIEW:

I notice that there has been invented a machine called the Electrical Separator, to be used in separating the iron from china clay, sand, etc. I am in search of such a machine and thinking you may be able to put me in communication with the inventor or manufacturer write you asking you to send me the address of the inventor or manufacturer of the machine. Thanking you in advance, I am, Very truly,

H. R. ENGLISH.

Jackson, Mo., October 16, 1895.

American Institute of Electrical Engineers' Resolutions on Franklin L. Pope's Death.

The regular monthly meeting of the Institute was held at 12 West Thirty-first street, New York city, October 23. Vice-president Crocker presided, and, after officially announcing the death of past president Franklin Leonard Pope, he stated that by special request of President Duncan Mr. Thomas D. Lockwood had prepared for presentation the following resolutions, which were adopted:

Whereas, The American Institute of Electrical Engineers has heard with heartfelt sorrow the sudden death by a lamentable accident of its past president, Franklin Leonard Pope; and,

Whereas, We, the members, council and officers of the Institute, desire to express our profound realization of the bereavement we have sustained and the sincere grief we experience, and to record in fitting terms our keen appreciation of the great worth and high qualities of our late fellow member, his eminent services to our organization and his able, unwearying and successful work in applying electrical energy to many useful purposes; it is, therefore,

Resolved, That by the death of Mr. Pope, called away in the full fruition of manhood and the meridian vigor of intellect, the profession at large has suffered an incalculable loss, and the Institute has been deprived of a most distinguished and valued member, and a wise and sagacious counselor, endeared to many members by long, pleasant and affectionate intercourse, and esteemed and respected by all, no less for his kindly and warm-hearted nature and dignified simplicity of character, than for his universally acknowledged genius and great ability.

Resolved, That we hereby express the poignant grief wherewith we contemplate the sad event which has taken from us, one, who, whether in the earliest days of our association co-operating in successful establishment, urbanely and efficiently presiding as our chief executive officer at business and social meetings, discreetly and judiciously performing the unassuming duties of a member of the Committee on Editing or in the capacity of an individual member, conserving the interests of harmony and stability, has uniformly had the dignity of the Institute at heart, and has assiduously, cheerfully and faithfully labored for its welfare.

And while we sincerely mourn the loss of an associate so eminent and useful, thus suddenly withdrawn from the activities of this present life, we most earnestly grieve for the parting from a friend so sincere, faithful and true.

Resolved, That we extend to his stricken family our tenderest sympathy in this, the hour of their affliction, and that in testimony thereof a copy of these resolutions be forwarded to them.

Resolved, That these resolutions be appended to the minutes of the council and be published in the transactions of the Institute.

At a meeting of the Brooklyn Electrical Society, held in the Edison Assembly Rooms, Brooklyn, October 15, 1895, the following preamble and resolutions were adopted:

Whereas, The members of the Brooklyn Electrical Society have heard with profound regret of the removal from our midst of our worthy and esteemed co-laborer in the scientific field, Franklin Leonard Pope; and,

Whereas, The intimate relations held by him with the science of electricity, during his life, make it fitting that we record our appreciation of him; therefore be it

Resolved, That the wisdom and ability which he has exercised in aid of the advancement of the science of electricity, by counsel, service and research, will be held in grateful remembrance;

Resolved, That the sudden removal of such a man from our profession leaves a vacancy and shadow that will be deeply realized by all members of the electrical fraternity and his name will ever remain as a martyr to the science in which he met his death;

Resolved, That with deep sympathy with the afflicted relatives and friends of the deceased we express an earnest hope that even so great a bereavement may be overruled for their highest good.

A copy of the resolutions was sent to Mrs. Pope.

LITERARY.

Cassier's Magazine has in its November number, among other noteworthy articles, "Burning Culm and Other Low-Grade Fuels," by John R. Wagner, with 22 illustrations of coal mining scenes, culm piles and approved furnaces for burning such fuels.

Anthony Hope's new Greek novel, "Phroso," about which so much has been said, has been secured by *McClure's Magazine*. It is said to be the most exciting novel of adventure written for many years. The magazine will also publish Stevenson's last novel and short stories by Rudyard Kipling, Ian Maclaren, Robert Barr and Bret Harte.

An Electric Brake for Street Railway Service.

An important new device exhibited at the Montreal street railway convention was the electric brake developed by the General Electric Company and shown in service in connection with two General Electric 800 motors. This brake has been developed to perform all the duties of mechanical brakes without their complications and faults. It operates equally well whether the trolley is on or off; in fact, the braking power is not derived from the central station, but is produced by the moving power itself.

The brake places the car under the absolute control of the motorman, and its operation is no more complicated than the operation of the ordinary controller. Indeed, the controller not only controls the motors, but at the same time operates the brake, starting, accelerating, retarding and braking the car. When making a stop, the controller handle is simply thrown from running to braking position, and electricity does the rest. The operations are the conversion of the motors into special dynamos for generating current at very low speeds, the cutting of all connection with the trolley current and the application of the brakes. The rheostats and contacts used to control the motors in running the car also control the current generated by the motors and needed to apply the brake. The braking action is two-fold and especially efficient. The rotating armature of the motor, instead of tugging ahead with its flywheel action by its momentum, is itself pulling back and more or less powerfully braking the car through the gears by the retarding effort of its magnetic field, while generating the braking current. The power, therefore, required to perform this work is taken from the energy of the moving car. Not only is the car thus retarded, but the brakes arrest the motion of the wheels direct with a powerful force under perfect control of the motorman. No new or strange device is introduced to the motorman; the combined electric brake and series parallel controller is only the K2 controller writ slightly larger. The brake mechanism is readily attached to the motor and axles. It consists of a cast-iron disk keyed to each axle and a compact electro-magnet facing each disk and attached to the motor frame, preventing it from revolving by suitable lugs. The maximum current in the brake circuit is regulated by a limit switch adjusted to limit the current automatically to an amount just under the slipping point of the wheels. Independently of this switch, the brake pressure can be graduated by the controller handle and a smooth, even motion secured on descending long grades. The disk and shoe are lubricated by a graphite brush carried in the shoe and pressing against the brake disk. This prevents excessive wear from friction and reduces the resistance between the shoe and disk, an important feature, as the eddy currents set up in the brake and shoe are even more effective in stopping the car than the simple friction between the shoe and disk. The installation connections of this mechanism are not complicated. The two sets of brake magnets are in series, securing the same retarding effect on both axles.

The advantages of this system of brake will be patent to all street railway operators. It can be applied to any axle without removing the wheels, and the wear and tear of the brake does not come upon the tread of the wheel. It is tested and repaired by the same means as the other electrical devices, and its low cost will undoubtedly insure for it a widespread adoption.

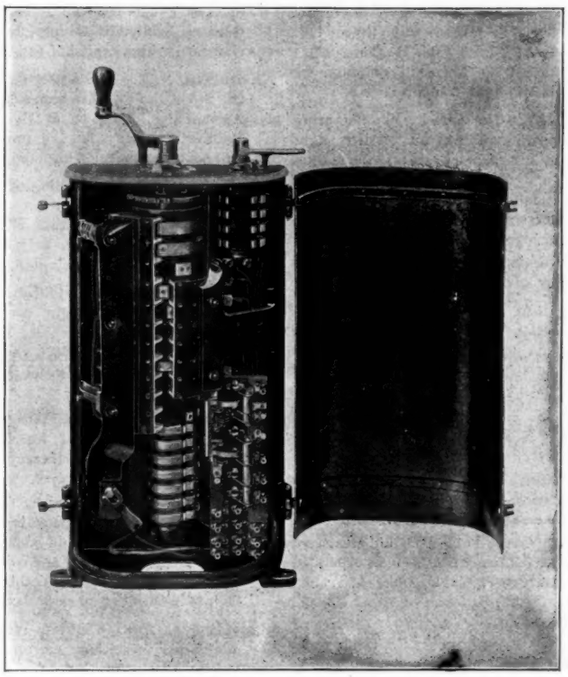


FIG. 1.—SERIES PARALLEL ELECTRIC BRAKE CONTROLLER.

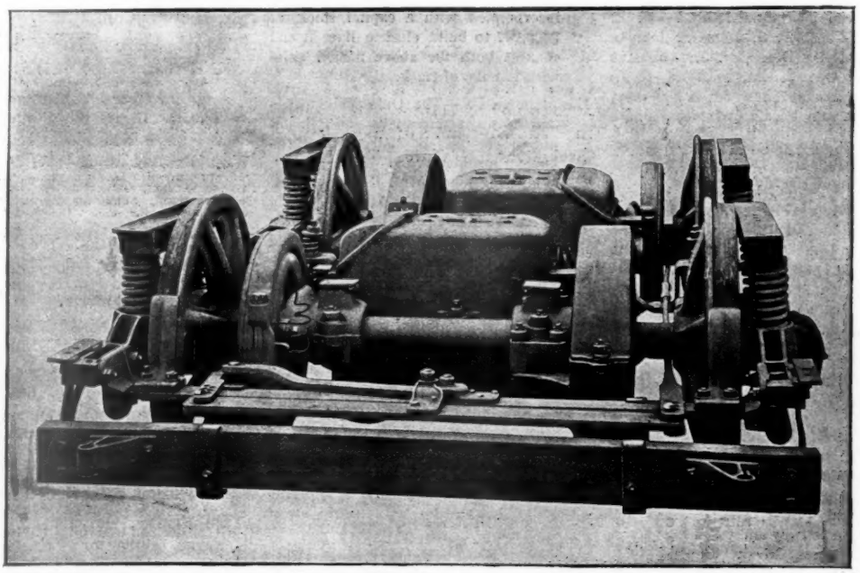


FIG. 2.—ELECTRIC BRAKE MOUNTED ON TRUCK.

The West End Street Railway Company, of Boston, operates 887 cars, all of which have been equipped with electric heaters.

Ohio Electric Light Association.

The annual meeting of the Ohio Electric Light Association was held at Piqua, Ohio, October 8. This was its first annual meeting, the association having been organized only in May last. The attendance at this first meeting was most gratifying under the circumstances. The secretary was able to report that the association now had on its membership roll nearly 50 per cent of all the central station companies operating in the State. The officers chosen at the preliminary meeting were re elected for the ensuing year. They are: President, A. W. Field, Columbus Edison Electric Light Company; vice-president, Wm. C. Hedges, Mansfield Electric Light and Power Company; secretary and treasurer, Samuel Scovil, Cleveland Electric Illuminating Company. Executive Committee, B. P. Holmes, Youngstown Electric Light Company; H. K. Wood, Piqua Electric Company; L. C. Newsom, Columbus Electric Light and Power Company.

The constitution of the association, as originally adopted, provided for active, associate and honorary members. At the Piqua meeting the constitution was amended so as to confine the membership to two classes, active and honorary members. Under the head of associate members, the original intention was to afford representation in the association to any manufacturer of electrical apparatus or supplies. Under this constitution as amended, manufacturing companies cannot now obtain representation in the association. The following resolution was unanimously adopted:

Whereas, Certain manufacturers of electrical apparatus have in the past, and are at this time, attempting to secure franchises for the installation of electric lighting plants in certain cities of this State; and,

Whereas, These franchises are not sought for the purpose of making a legitimate investment, inasmuch as the demand for electric service in these towns is not sufficient to support an additional company, but is rather for the purpose of compelling the existing companies to become customers of these manufacturing companies.

Resolved, That this association now puts itself on record as condemning such business methods as being neither more nor less than blackmail, and that such methods justify the association in requesting each of its members to refuse to purchase of such companies any apparatus whatsoever, if they thus continue their piratical attacks upon the invested capital which this association represents.

At the morning session of the association, October 9, Mr. Caryl D. Haskins, of the General Electric Company, read a paper on the "Use of Meters and Transformers," which was very interesting and considered so valuable that the secretary was directed to have it printed and distributed to the members of the association.

With the November number *McClure's Magazine* commences the publication of a new "Life of Abraham Lincoln," which promises to be unique in many ways. It is to contain a complete series of the portraits of Lincoln, over 40 in number, more than twice as many as have appeared in any previous biography, and including many important portraits that have never before been published.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

Electric Light and Power.

DANVILLE, IND.—J. S. Richards, of Marshall, Ill., has closed a contract on an electric light plant in this city. Twenty arc lights will be put on the streets and the old waterworks plant and boilers will constitute the power house of the lighting house.

FRANKFORT, IND.—The local electric light plant was sold recently to the Indiana Natural and Illuminating Gas Company. Consideration about $45,000.

HOMESTEAD, PA.—The electric light plant at this place has been sold to the Carnegie company. It will be repaired and operated to furnish light to the borough until January 1. In the meantime a new plant will be erected inside the steel company's enclosure. The old plant cost $50,000.

BLOOMINGTON, ILL.—The Bloomington Electric Light Company has filed a certificate of reduction of stock from $125,000 to $40,000.

AMSTERDAM, N. Y.—An electric light plant is to be erected in Johnstown.

YUMA, CAL.—An electric light plant is to be put in the penitentiary building.

CAMBRIDGE, MD.—The Cambridge Electric Light and Power Company has been organized by Jas. F. Morris, M. N. Packard, S. Nordlinger and T. J. Ewell, of Baltimore, and John G. Mills, to erect an electric light and power plant. Capital stock, $10,000.

KNOXVILLE, TENN.—The Knoxville Electric Light Company has commenced preparations for expending $30,000 on a new power house and remodeling the present plant.

CONOWINGO, MD.—The Susquehanna River Electric Company has had plans prepared for its proposed water power electrical plant, which is to furnish 40,000 horse-power.

LEXINGTON, MO.—The Lexington Electric Company has been incorporated by E. R. Kimball, E. G. Taylor, C. A. Burton, E. O. Marquis and D. M. Wolfe, to furnish electric light, power and transportation to the city. Capital stock, $80,000.

MARLIN, TEX.—R. M. and J. M. Odell will erect an electric light plant for the city.

OGAMAW, ARK.—The Hickok Lumber Company will put in a 150-light electric plant and is in the market for machinery for same.

BRIDGEPORT, CONN.—The Chaquette Power Company has been incorporated by Ephriam Chaquette, Daniel Davenport and William H. O'Hara. Capital stock, $75,000.

VEVAY, IND.—Steps are being taken to establish an electric light plant.

SARATOGA, N. Y.—The Saratoga Gas and Electric Light Company have been awarded contract to light the village with electricity for four years.

FULTON, MO.—A new electric light plant is being established. Machinery is being placed in position.

BALTIMORE, MD.—New electric light plants will probably be established at Druid Hill and Paterson Parks.

CORUNNA, MICH.—An electric light plant is to be established and $8,000 worth of bonds will be issued for same.

AKRON, OHIO.—Barberton Electric Company will double the capacity of its plant and electricity for lighting purposes will be furnished to Wadsworth, Doylestown, Clinton and other towns.

WYOMING, NEB.—West Placer Company will put an electric light plant in its works.

BRIDGEWATER, MASS.—An electric light plant is to be established at the Bridgewater State Farm.

BLOOMFIELD, N. J.—John P. Conklin has petitioned the township committee for an electric light franchise.

ROME, N. Y.—The O'Neill Manufacturing Company will put an electric light plant in its factory and is in the market for a dynamo (Edison, Westinghouse or Thomson-Houston) of 75 or 100-light power, second hand or new; also material for wiring factory.

LITTLE ROCK, ARK.—J. P. Faucette and others have been granted permission to erect an electric light plant.

NORTHFIELD, VT.—The contract for installing the new electric light plant at the Waterbury insane asylum has been awarded to Almon & Sargent.

DEPEW, N. Y.—The Union Car Company's plant is soon to be lighted with electricity.

CLEVELAND, OHIO.—A project has been started to organize a West side electric light and power company.

DENVER, COLO.—Jones-Waldo Heat and Light Company has been incorporated by Harvey S. Waldo, Chas. A. Waldo, Hiram W. Jones. Capital stock, $10,000.

EASTPORT, ME.—Eastport Lighting Company has been incorporated by Wm. A. Carey, Malden, Mass.; W. H. Whitney. Capital stock, $50,000.

EAST ORANGE, N. J.—Suburban Electric Light and Power Company has been incorporated by Wm. H. Allen, S. Walter Freeman, Jerome D. Gedney. Capital stock, $200,000.

WILDWOOD, N. J.—Five-Mile Beach Electric Light, Heat and Power Company has been incorporated by Frank E. Smith, Chas. A. J. Johnson, John L. Busk, Holly Beach, N. J.; Augustus Hilton, Geo. J. Ent, Anglesea, N. J.; Wilson Banks, Wildwood; B. F. Bailey, Philadelphia, Pa. Capital stock, $50,000.

WEBB CITY, MO.—J. C. Stewart is contemplating organizing a company to establish an electric light plant.

ATCHISON, KAS.—The Atchison Gas, Electric Light and Power Company proposes to furnish houses steam. It will be piped to all houses like gas. James M. Chisham, at a meeting of the City Council, asked for permission to erect a steam heating plant, and for franchise giving it the right to the streets and alleys for the laying of its pipes.

FORT SMITH, ARK.—Fort Smith & Van Buren Light and Transit Company has been incorporated by M. M. Beatty, H. C. Mechem, J. H. Clendenning, Ralph Mechem and E. A. Yomans to produce and furnish gas, electric light, heat and power, and to erect and operate a railway and toll bridge across the Arkansas River. Capital stock, $200,000.

DUBLIN, GA.—An electric light plant is to be erected, and surveys are being made for same.

COLLINSWOOD, PA.—The residents of this place are agitating a movement to light the whole borough with electricity.

VIRGINIA, ILL.—The electric light plant at Virginia, Cass County, is being changed into an incandescent plant exclusively.

GRAFTON, N. D.—The city has bought the electric light plant for $7,000.

New Electric Railways.

BUTTE CITY, MONT.—A franchise has been granted to the Butte City Consolidated Railway Company.

WASHINGTON, PA.—Washington & Cannonsburg Railway Company has been incorporated to construct a line of seven miles from Washington to Cannonsburg, in Washington County. Capital, $70,000.

HARRISBURG, PA.—The Mahoning Valley Street Railway Company, which will operate a line between Ashland and Gordon, Schuylkill County, has been chartered with a capital of $18,000.

AMSTERDAM, N. Y.—The Amsterdam Electric Street Railroad has been sold to the Amsterdam, Johnstown & Gloversville Railroad Company, but the purchasers will not take possession until the Spring.

BENNINGTON, VT.—The Bennington & Rutland Railway Company are making arrangements to substitute electricity on the five-mile branch between Bennington and North Bennington.

HARTFORD, CONN.—Westport Electric Road; A. S. Hoyt has bought controlling interest for $20,000.

SARATOGA, N. Y.—An electric road is to be constructed between Stillwater and Mechanicsville.

WILKESBARRE, PA.—Carle & Flanagan have been awarded contract for building the Luzerne, Dallas & Harvey's Lake Electric Railway.

GREENPORT, N. Y.—Greenport Electric Light and Power Company is making arrangements with Tuthill and Higbee to conduct the business and enable the stockholders to realize something from their investment at an early day.

PINE BLUFF, ARK.—Charles Weyl and others are soliciting correspondence looking to the making of a contract for erecting and maintaining an electric street railway, electric light plant and waterworks.

NORTH ATTLEBORO, MASS.—Arrangements are being made to equip the cars of the Interstate street railway with electrical heating apparatus.

WATERLOO, IOWA.—Waterloo and Cedar Falls Rapid Transit Company has been incorporated with a capital stock of $600,000 to build electric lines in and connect both the above named cities with 12 miles of track.

HARRISBURG, PA.—The Ohio Valley Electric Railway Company has been incorporated by W. B. Carson, of Pittsburgh, president, and W. B. Howay, Wm. Hageman, Wm. T. Lindsay, H. E. Lineweather and Edgar C. Gerwig to construct an electric line to run from Avalon, Allegheny county, to Clenfield Borough. Capital stock, $175,000.

NEW YORK, N. Y.—The Metropolitan Street Railway Company is to erect a one-story brick storage building at the southwest corner of Lenox avenue and One Hundred and Forty-seventh street, to cost $20,000.

CADIZ, KY.—Steps are being taken to construct an electric railway from Cadiz to Gracey at a cost of $100,000.

KANSAS CITY, MO.—The Missouri, Kansas & Texas Trust Company is applying for franchise for an electric street railway.

PALMER, MASS.—The Palmer & Monson Electric Railway Company's stockholders have petitioned for franchise to construct a $100,000 electric line to run from Monson through Palmer to Three Rivers.

JACKSONVILLE, FLA.—The Jacksonville Street Railway Company, of which D. F. Jack is president, will extend its electric road to Panama Park.

TACOMA, WASH.—The City Park Railway Company and the Tacoma Railway and Motor Company have petitioned for permission to extend their electric roads, at a cost of $100,000.

SAN JOSE, CAL.—J. F. Pleftch and L. M. Hale have been granted permission to construct an electric railway to Saratoga.

Business Troubles.

LEMARS, IA.—Dr. M. W. Richey and J. H. Winchell have applied for a receiver for the waterworks and electric light plant.

PITTSBURGH, PA.—The General Electric Company yesterday made application in the United States Circuit Court for a receiver for the Pittsburgh Fuel Company, which is indebted to the General Electric Company in the sum of $4,660.65 for machinery.

NEW LEBANON, PA.—Four executions were issued yesterday morning against the Elizabethtown Electric Light Company, Harvey Houck, president, and J. Bradley Eckert, secretary and manager.

NEW YORK CITY.—Bagnall & Hilles, who carry on a general electrical supply business in Yokohama, Japan, with an office at No. 15 Cortlandt street, New York city, made an assignment on October 24. It is said that the failure was principally due to the shrinkage in silver and cost of exchange.

New Manufacturing Companies.

IRONTON, OHIO.—The Enclosed Carbon Lamp Company is the title of a stock company which has been organized in this city, with a capital stock of $50,000. The new company will manufacture what is known as the carbon enclosure for arc lamps.

BALTIMORE, MD.—The Lucas Electric Construction Company has been incorporated by J. Clarence Lucas, Rigaway Merryman, Charles E. Burgan, William V. Wilson, Jr., and Wm. M. Burgan, for conducting an electric construction business and dealing in electrical supplies. Capital stock, $2,000.

SAN FRANCISCO, CAL.—Safety Electric Elevator Company has been incorporated by John W. Gentry, Oakland; Jeffrey Jacob, Fruitvale; John Cushing, N. W. Spaulding, R. D. Hunter. Capital stock, $100,000.

New Telephone and Telegraph Companies.

NORWALK, CONN.—The Norwalk Mutual Telephone Company has been organized. The membership fee is $100, entitling each subscriber to a telephone service. George W. Coy, of Milford, is the secretary.

WEST EXETER, R. I.—The Postal Telegraph Company is soon to erect a new telegraph office on the old turnpike road.

FERGUS FALLS, MINN.—The contract for the new electric light plant has been granted to Burtis & Howard, of Minneapolis, for $12,900.

SOUTH EDMESTON, N. Y.—A telegraph line is being talked of in this village.

Increase of Capital Stock.

ST. LOUIS, MO.—The Laclede Power Company has increased its capital stock from $75,000 to $400,000.

Henry Electrical Club.

On Friday, October 25, Mr. Geo. F. Sever, instructor of electrical engineering at Columbia College, delivered a lecture on "The Compound Wound Dynamo;" and on Friday, November 1, Prof. M. I. Pupin, of Columbia College, will give a popular discourse on "Alternators." These lectures will be held at the American Institute of the City of New York, 111-115 West Thirty-eighth street, and everybody interested is cordially invited to attend.

Electric Power for Long-Distance Transmission.

For periods of time ranging from two years down to a few months, writes Dr. Louis Bell in *Cassier's Magazine*, not less than 50 power transmission plants have been working regularly in different parts of the world, ranging in magnitude from Niagara down to 50-horse power, and in distance from the Folsom-Sacramento transmission, in the United States, having an extreme length of about 25 miles, down to a mile or two. All these plants have been singularly free from trouble and have done their work well.

Admitting that distances up to 20 or 25 miles can be successfully overcome, is there a reasonable probability that the transmission of power can be extended over distances much greater? Yes, if necessary. We have no plants over 25 miles, but the methods and apparatus for longer transmissions have already been thoroughly tested, and up to at least 50 miles we are sure of our ground—perhaps up to 100 miles. The transmitting and receiving machinery would be quite identical whether the line between them were 20 or 50 miles long, so that, as regards apparatus, the ground is well trodden.

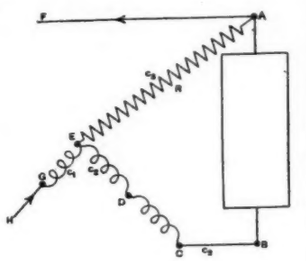
For very long transmissions high electrical pressure is necessary to keep down the cost of the line, since the amount of copper required to meet given conditions decreases with the square of the voltage. And we have already experience with the voltage just as with the apparatus—at least with voltages ample for a 50-mile transmission. For example, without counting the famous Lauffen-Frankfort experimental plant, with a line 108 miles long, and operated part of the time at a pressure of nearly 30,000 volts, there are now in commercial service four plants, running steadily and successfully at pressures of 10,000 volts and more. Chief among them is the Oerlikon installation in Switzerland, working at over 14,000 volts; then come Folsom-Sacramento, in the United States, and Guadalajara, in Mexico, at 11,000 each; and, finally, the San Antonio canyon plant, in the United States, at 10,000. The first and last mentioned have been in operation nearly three years without having encountered any appreciable difficulty from the very high pressure. The other two have been operated some months without a trace of trouble. From these experiences there is the best of reason to believe that voltages up to 14,000 or 15,000 are entirely justified by present practice.

Concerning distances of 100 miles or more, and pressures exceeding 15,000 volts, we have only the results at Lauffen by way of data. While these make no pretense of representing commercial practice, they still are good evidence that, as an engineering feat, a transmission of 100 miles at 25,000 or 30,000 volts is quite practicable. While the feasibility of covering far greater distances at much greater voltage is more or less a matter of speculation, those who know most about the difficulties to be met fear them the least.

AN ALTERNATING CURRENT WATTMETER.

BY PROF. JOHN PERRY, F.R.S., IN THE LONDON "ELECTRICIAN."

About two years ago I invented a very simple instrument, which measured watts exactly, however great the lag may be in amperes behind volts. Only one reading is necessary, and the instrument costs about the same as a Siemens dynamometer. I have had only one specimen made, and I have made no efforts to get it manufactured because I have found that in nearly all practical work the error when one uses an ordinary dynamometer is quite negligible. This is due to the fact that sufficient power is wasted even in an unloaded transformer in eddy currents and hysteresis to prevent the lag being excessive. But it may be that in the future greater exactness may be wanted, and it may be well to describe my instrument. I had intended to publish a number of tests made by Mr. Eborall, late of the Finsbury Technical College, but, as they only bear out what any one can see to be true from the construction of the instrument, I need not trouble the reader with them. Mr. Eborall constructed the instrument which he tested.



AN ALTERNATING CURRENT WATTMETER.

In the figure, A B is any contrivance to which electric power is being given by alternating currents; it may contain motors, condensers, choking coils, lamps or other apparatus. There are two coils of wire, E G and E D, which are wound together on the fixed bobbin of a dynamometer in such a way that if the same current passes from G to E and E to D no magnetic effects will be produced; in fact, the fixed bobbin is differentially wound. The coil D C is the movable coil of the dynamometer. It is therefore evident that the reading of the instrument represents (to some scale dependent on number of turns of wire and the controlling moment) the average value of $(c_1 - c_2)\, c_2$ or $c_3 c_2$. Now, E A is a non inductive resistance of amount R, and if this is known, since Rc_3 represents the voltage between E and A, the reading of the instrument represents the average power supplied to A B and to the part E B. The power supplied to the part E B is insignificant. The instrument is easily graduated and tested by continuous currents. Also at any time, by disconnecting E A, we can test whether G E or E D completely destroy each other's effects on the movable coil, and if they do not do so it will usually be found that a slight adjustment in position of one of the wires to the binding screws G or D will be a sufficient correction.

Even if the small power supplied, say, to an unloaded transformer, is to be measured, and if the ordinary Siemens dynamometer frame and method of control be employed, I have found that the cost of and space taken up by the non-inductive resistance are not of importance. Of course, they are of less and less importance as the power is greater, and as the volts are less and if a more delicate method of control is employed. Any one who cares to employ this method will find it well to remember that if he uses considerable resistance between E and A, or if from any other cause the currents c_1 and c_2 are considerable and their difference small, it will depend upon the nature of the control whether there may not be too much heating of the fixed coil for its structural safety when measuring up to the limiting readings of the instrument.

In this description the words fixed and movable are interchangeable. The method is applicable to motor supply meters.

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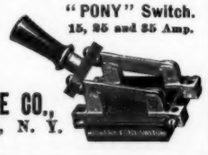

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REPORT ON TIES AND POLES.

ABSTRACT OF A COMMITTEE REPORT SUBMITTED TO THE AMERICAN STREET RAILWAY ASSOCIATION, MONTREAL, OCTOBER 16, 1895, BY N. W. BROWN, OF ATLANTA, GEORGIA.

A thorough examination has shown conclusively that six years is the longest life we may expect of select pine ties, and we are led to believe that eight years is the longest life we may expect of oak ties.

We have conferred with many street railway engineers and find positively no uniformity of opinion or practice as to the best tie to use. Very few engineers claim to have solved the problem of ultimately the most economical track construction by adopting metal ties. It seems to be generally conceded that metal ties require for their proper foundation a thorough bedding in concrete, and if it is granted (as claimed by a few American and many English and continental engineers) that a concrete foundation is necessary in any good track, then the selection of metal ties may bespeak good judgment in deep rail construction, but most American engineers claim that concrete is not necessary in first-class track construction, and if this opinion (in which we heartily concur) is correct, then there can be few cases, if any, where metal ties would be most satisfactory and economical.

In New Orleans excellent results have been obtained under horse car tracks with red cypress, which is reported to have been in good condition after 28 years of service. Red cypress and especially black cypress are among our most durable woods, but their extreme softness and inability to properly hold spikes have been a serious hindrance to their extensive adoption for railroad ties. The extraordinary results reported in New Orleans are doubtless due to the light requirements of horse car service, and the fact that these ties were always in very damp, marshy earth, if not actually submerged in water. A prominent timber expert estimates that black cypress in tracks in Atlanta, Ga., ought to last about 10 years, and the information before us leads us to believe that this estimate must be about correct.

After consulting all the few reports and treatises available upon the subject of timber preservation, we have conferred again with many members of the American Society of Civil Engineers and other experts, and our opinion seems to be universally endorsed that efficiently cresoted ties are ultimately the most economical for use in street railway work. At present we omit the vulcanizing process, which has in a few cases given good results, but whose merits are still in a measure in question. We can say that the preservation of timber in quantity is confined almost exclusively to two standard and long-established processes, viz., burnettizing and creosoting. Burnettizing, or the treatment with zinc chloride, is the process (modified by patents in some cases) most extensively used in America for the preservation of railroad ties, mainly on account of its least cost, its resistance to being burnt, and on account also of its being simpler or safer than the treatments by the injections of other metallic salts.

The creosoting process was invented and established in 1838 by John Bethell, of England, and for many years past it has been almost universally used in England and France for the preservation of ties and telegraph poles. The average life of creosoted beech ties on the Northern Railway of France is 27 years. Properly creosoted spruce ties in England last from 16 to 20 years.

For a long time six inches by eight inches by seven feet were our standard dimensions for ties, but over a year ago we changed these to five inches by nine inches by seven feet, and consider our present standard more satisfactory.

Assuming the ties to be spaced two feet six inches apart, C to C, creosoted ties will cost 24 cents per lineal foot of track; therefore, 60 cents (36 + 24) will represent the cost of labor and ties per lineal foot in rebuilding. Principal and interest on 60 cents at six per cent for 24 years, $1.46—which is the actual cost per lineal foot of keeping ties under this track for 24 years.

Cypress ties will cost 16 cents (36 + 16) will represent the cost of labor and ties per lineal foot in rebuilding where they are used. With a life of 12 years, which is generally assumed as the maximum in railroad practice, two renewals would be required in 24 years; therefore, for the first renewal:

Principal and interest 52 cents at six per cent for 24 years	$1.27
And for the second renewal: Principal and interest 52 cents at six per cent for 12 years	.89
	$2.16

Oak ties will cost 12 cents per lineal foot and 48 cents (36 + 12) will represent the cost of labor and ties in rebuilding where they are used.

With a life of eight years three renewals would be required in 24 years; therefore, for the first renewal:

Principal and interest 48 cents at six per cent for 24 years	$1.17
For the second renewal: Principal and interest 48 cents at six per cent for 16 years	.94
For the third renewal: Principal and interest 48 cents at six per cent for eight years	.71
	$2.82

Pine ties will cost 10½ cents per lineal foot and 46½ cents (36 + 10½) will represent the cost of labor and ties in rebuilding where these are used.

With a life of six years four renewals would be required in 24 years; therefore, for the first renewal:

Principal and interest 40½ cents at six per cent for 24 years	$0.988
For the second renewal: Principal and interest 40½ cents at six per cent for 18 years	.842
For the third renewal: Principal and interest 40½ cents at six per cent for 12 years	.696
For the fourth renewal: Principal and interest 40½ cents at six per cent for six years	.551
	$3.077

From these comparisons we see that, with the lives assumed, cypress will cost 48 per cent more than creosoted timber, oak will cost 92 per cent more than creosoted timber, pine will cost 111 per cent more than creosoted timber.

These comparisons assume that the service of the different ties during their lives is equally satisfactory, which is practically correct in the case of oak, pine and creosoted pine, but cypress, on account of its softness, gives inferior service.

Red cedar poles have been almost universally used in our overhead construction, although iron poles set in concrete have been used in the heart of the city and cypress poles have been used in a few cases when we could not secure cedar promptly.

The specifications by which most of our cedar poles were purchased required 28 feet in length and a minimum top diameter of six inches, but these poles proved too small and in many cases too short, especially where guard wires are required.

These red cedar poles for this market are generally obtained in East Tennessee, although the timber exists more or less bountifully in many sections of the South. It has been used almost exclusively by the Western Union Telegraph Company and they estimate that their poles last, on an average, about 15 years. The sap generally decays in five or six years and in many cases they find that the heart decays in 12 years, while, again, in many cases it will last 20 years.

Cedar poles, especially when used according to the ordinary custom, have many defects in street railway service.

1. Their life is practically limited to the life of their sap, as when this decays the heart left is too small and weak for reliable service.

2. Larger poles are liable to be very defective, generally being hollow at the butt and frequently containing rotten knots.

3. Cedar is very brittle and treacherous under tension.

4. Large, short poles are excessively expensive, as they are equivalent on the market to long poles cut off.

We are now estimating that our cedar poles with large hearts will last 12 years. The cedar poles we have used appear to have cost us about $4 each, erected.

Our iron poles, which have cost about $18 each, erected, do not appear to be lasting as well as was hoped. They have too great a tendency to rust near the ground, and we doubt whether they can be safely depended upon for more than 15 years.

We believe properly creosoted pine piles, 30 feet long and eight inches at the top ordinarily, and 10 to 12 inches at the top where special demands are made upon them, should be equal in point to excellent service and superior in point of long service to any poles on the market.

These poles, treated by contract to No. 10 of creosote per cubic foot, should not cost more than $5 each, erected, and when treated in one's own plant, this price could doubtless be reduced to $3.50.

Pine in its growth is one of the most perfect and symmetrical of all timbers, besides having a tensile strength about twice as great as cedar. Creosoting is generally conceded to increase the strength, and all these properties would seem to indicate that the creosoted pine pole should be strong enough and next enough for city work, but it is the long life that makes this pole most eminently suited for street railway work.

Mr. W. H. Preece, the celebrated English telegraph engineer, reported in 1884, as a result of 30 years of experience, that he had never seen one single properly treated telegraph pole which showed the least decay, and he referred to 318 poles, which, after 35 years of service, were torn down to make way for larger poles, every one of which showed after this service no signs of decay. Creosoted poles are universally used in English telegraph work. The district superintendent of the Western Union Telegraph Company here tells us that he was recently asked to examine a lot of creosoted poles, supplied to his company for experiment by the works at West Pascagoula, Mississippi, 12 to 15 years ago perhaps (as well as he remembers) and that he found every one in perfect condition. He dug down to the bottom of many and could find no sign of decay.

Creosoted poles have a great advantage—in being perfect insulators—over iron poles—which are grounded conductors, and liable to cause accidents to the lines and linemen.

If creosoted poles are superior to cedar in almost every respect, the question naturally arises, why are they not adopted by the Western Union Telegraph Company? This question is easily answered.

Most of the poles of this company are along the railroads and insecurely protected against fire. A creosoted pole is very inflammable and they are afraid this one great disadvantage in their work would more than offset its advantages.

Much has recently been done toward developing to perfection the rational standards in street railway engineering practice, but we fee that these standards in track and line construction would be, as a rule, improved by the use of creosoted timber.

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An Improved Electric Car Heater.

The Interior Conduit and Insulation Company, of New York, has introduced this season an electric car heater which embodies great improvements in this class of apparatus. A much higher efficiency has been obtained in these heaters over other machines which have heretofore made their appearance, and this economy of operation is by far the most important factor which is considered by any railway company. All the electric energy absorbed by any electric heater is converted into heat units, and it has, in consequence, been assumed by many that electric heaters are of necessity of equal efficiency, but this is not the case. It is not sufficient merely to create heat, but also to utilize it to the best advantage, and in order to do this it is imperative that the heat should be distributed and circulated where it is needed and as fast as it is generated. No other electric heater, it is claimed, has heretofore been constructed that will do this. In other heaters a large proportion of the heat produced has been non-effective for any useful purpose owing to lack of proper distribu-

AN IMPROVED ELECTRIC CAR HEATER.

tion, as most of the air current passes around the coils, leaving the heat dormant, and the case of such heaters absorb a large quantity of heat, so much so that in some instances fire has been caused. Such machines require from six to 12 amperes at 500 volts to sufficiently warm the car.

In the heater manufactured by the Interior Conduit and Insulation Company a continual circulation of air is maintained. All the air passes through the coils, and all the heat generated is carried off and distributed into the body of the car, the case of the heater remaining perfectly cool. There is absolutely no waste, and consequently a much higher degree of efficiency is obtained than has hitherto been practicable. These heaters are thoroughly well made, neat in appearance, easily installed, and are amply guaranteed.

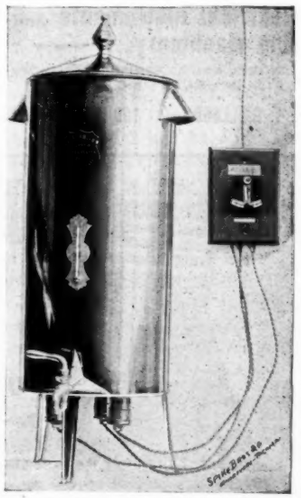
A New Electric Heater.

There will shortly be placed upon the market a new system of car heating by electricity. The apparatus is the invention of Mr. John Hencken, of New York city. A company is forming for the manufacture and introduction of this heater, with Mr. Hencken as its president. Briefly, the new system may be described as resembling an ordinary steam-pipe radiator. The heat is generated by a specially prepared german silver wire, which is run through the pipe and the initial heat from the wire stored in the pipe, the pipe being hermetically sealed. In this way a temperature of 200 degrees Fahrenheit can be maintained upon the surface of the pipes, of which there are two sets of four 15-foot lengths on each side of the car under the seats, giving in all a radiating surface of 40 square feet, which it is claimed is more than sufficient to heat an ordinary 22-foot car, using three amperes at 500 volts. In a paper read before the New York Street Railway convention, on September 17, it was claimed that it required 20,000 British terminal units to properly heat an 18-foot car in the latitude of New York State. By reference to the table below, which is the result of a test taken last Winter by a representative of a prominent heating concern, who claimed it was impossible to heat a car on three amperes, it will be seen that not more than 5,000 British terminal units were consumed per hour, although the car in which the test was taken was in a very poor condition, having large cracks in the floor immediately under the heater. The trap doors had been wrenched from their hinges to facilitate the repairs of the motor. By the use of this system, a car now equipped with steam-pipe radiators can have its heating changed to electric at a very small cost.

REPORT TAKEN JANUARY 4, 1895, VOLTAGE 485.

Time. P. M.	Amperes.	Temp. Outdoors.	Temp. in Car.	Temp of P pe.	Numb'r Passengers
1.15	3	25	51	146	10
1.20	3	25	50	154	14
1.25	3	24	49	158	18
1.30	3	25	51	164	22
1.35	3	23	52	167	17
1.40	3	24	51	170	13
1.45	3	24	52	174	13
1.50	3	25	52	175	10
1.55	3	26	52½	176	9
2.00	3	29	52	178	16
2.05	3	29	51	178	15
2.10	3	27	51½	178	27
2.15	3	29	53½	178	24
2.20	3	27	55	178	25
2.25	3	23	54	178	19

This car was making its regular trips between Troy and Lansingburg, along the river front, and on a windy day. The inside thermometers were hung on the first strap from the door.



The above cut shows the **Espersen Electric Water Heater,** the simplest device of its kind on the market. High in efficiency, economical in service, low in price.

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The Amazon Cable.

Mr. Alexander Siemens, with a representative of Messrs. Clark. Forde and Taylor, consulting engineers to the Amazon Telegraph Company, Limited, according to London *Engineering*, is now engaged in surveying the route for the new cable about to be laid up the Amazon from Pará to Manaos, under exclusive concessions from the government of the Brazilian Republic. The entire length is 1,365 nautical miles and there will be in all 16 stations on the line. The "Faraday" will probably leave England next month with the cable, more than half of which is already manufactured. This long sub-fluvial line will, for the first time, bring these regions, so increasingly productive of india-rubber, coffee and sugar, into direct telegraphic communication with Europe. All past attempts on the part of the Brazilian government to establish aerial lines through these districts have failed, owing to the rapidity and density of the forest growths. Mr. Reidy, representative of the Amazon Telegraph Company, joined the expedition at Pará. The great importance of the Amazon as a trade route may be gathered from the fact that the "Faraday," a steamer of 5,000 tons burden, will proceed all the way up to Manaos, a distance of 1,100 miles from the mouth of the river.

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KINDRED INTERESTS

The Westinghouse Electric and Manufacturing Company have begun the erection of a foundry and machine shop in addition to their big East Pittsburg plant. The new departments, which will employ 300 additional workmen, are to be completed by January.

The American Electric Telephone Company, of Kokomo, Ind., has recently made the following important sales of telephone apparatus: Altoona, Pa., 400 telephones; Cairo, Ill., 300; Madison, Ind., 200; Tyrone, Pa., 100; Butler, Pa., 100; Fall City, Neb., 100; Gainesville, Ga., 100; Hollidaysburg, Pa., 75; Point Pleasant, W. Va., 50.

A. Chisholm & Company, Bay City, Mich., report that they have mailed samples of their "Peerless" commutator compound to the street railways and lighting plants of the country. Any one who has not received a sample can obtain one by writing for it. This compound is having a remarkable sale in this country with an increasing demand in Europe.

President Rhotehamel, of the Columbia Incandescent Lamp Company, St. Louis, says that the Fall trade in incandescent lamps is much better than was anticipated. Consumers are demanding high quality lamps and are willing to pay a fair price for what they want. A large order for Columbia lamps was recently placed for the New York *Life* Building.

The Adams-Bagnall Electric Company, 47 East Prospect street, Cleveland, Ohio, have issued a good catalogue of the "A-B" incandescent lamps which are described elsewhere in this issue of the ELECTRICAL REVIEW. This new type of lamp is well presented in the catalogue, and lamp users should at once send for a copy. The "A-B" lamps are made with eight types of standard bases.

The Brush Electric Company, Cleveland, Ohio, has issued a very handsome pamphlet containing Mr. Charles N. Black's paper on "Large Arc Dynamos," read before the National Electric Light Association at its Cleveland meeting last Spring. This paper appeared in the ELECTRICAL REVIEW at the time it was read. In its present form it is embellished with a number of new illustrations.

The Fort Wayne Electric Corporation, Fort Wayne, Ind., has issued a complete catalogue of the Wood systems of electrical machinery and apparatus for light and power. Arc and incandescent apparatus for both alternating and direct currents are beautifully illustrated and fully described. The cover is embossed in gold and colors, and the catalogue as a whole is one of the most artistic and satisfactory that the ELECTRICAL REVIEW has received.

The Berlin Iron Bridge Company, of East Berlin, Conn., has lately completed for Wilmot & Hobbs, of Bridgeport, Conn., a new rolling mill to take the place of the one lately destroyed by fire. The main mill is 126 feet wide and 200 feet long with engine and boiler room attached in a separate wing 54 feet wide by 90 feet long. The construction is entirely fire-proof, no wood being used about the building, so the risk from fire is absolutely eliminated. The roof covering is the Berlin Iron Bridge Company's patent anti-condensation corrugated iron.

High Speed Telegraphy.

Mr. Patrick B. Delany recently made a test of his high-speed system of telegraphy in Philadelphia which, according to report, was very successful. The new system is worked automatically, a punched tape taking the place of the sending operators. Its great advantage over other systems is claimed to be that over a single wire as many as 1,000 words a minute can be sent between points as far distant from each other as New York and Chicago. The first message sent over a line of high resistance, 218 miles long, was received in perfectly legible shape, as was every other sent during the test. The speed, which was at first 720 words a minute, was increased to 940 a minute without any decrease in the legibility. Mr. Delany stated that, with a wire weighing 850 pounds to the mile, which would give a line resistance much less than that used in the above test, he could send 1,000 words a minute with equal legibility, and at a cost not exceeding five cents for 50 words.

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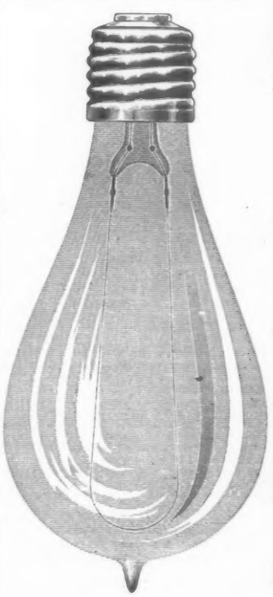
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